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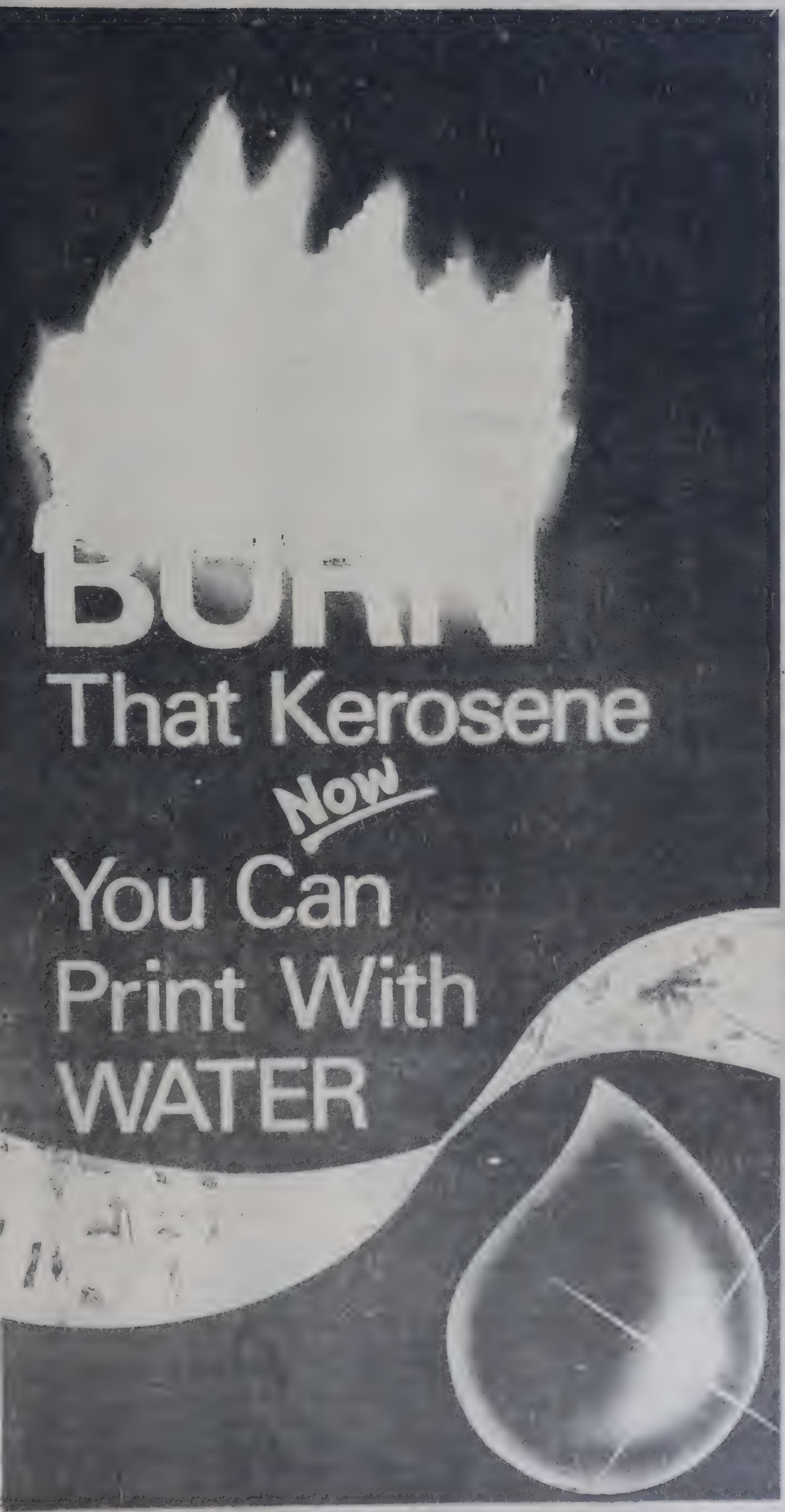

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CONTENTS

CHEMICAL WEEKLY

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he Greenhouse Effect and World Agriculture

alf the world's population — most of them low income families — live on rice. However, with the rease in greenhouse gases and a corresponding four grees centigrade increase in temperature by the year 50, rice production in the world is expected to plum- t by 25 per cent.

n a situation where 500 million people stay hungry eady, this prediction of the Food and Agriculture ganisation (FAO) is indeed alarming.

The picture for agriculture and food security in the 21st ntury is extremely bleak. The burgeoning population expected to cross the ten billion mark, the prices are ing at a frenetic pace and the purchasing power of e rice eaters is severely eroded.

Despite the United Nations and other international co- eration ventures, the world is unable tc share the food ailable. Climate change is expected to further widen e north/south gap in agricultural production.

What is worse as Mr. D. Norse, senior policy and anning co-ordinator at the FAO, pointed out to a group science writers, the nuances of climate change on gricultural resources are still being worked out. FAO xperts find themselves having to plan for an uncertain ture.

Countries of south-east Asia who grow rice and live n it have good reason to worry. The cloud cover or mbrella created by greenhouse gases will reduce sun- nine and thereby have a direct impact on paddy cul- ation.

It has been established by agriculture scientists that roduction of rice is 25 per cent more in the dry season hen there is sunshine than in the monsoon when there a cloud cover. But in 20 to 30 years when carbon diox- le and other gases trap heat there could be a cloud ver round the year.

Ironically enough, of the seven billion tonnes of green- house gases being released into the earth's atmosphere, agriculture and forestry contribute 14 and nine per cent respectively. Carbon dioxide, methane and nitrous oxides are the main greenhouse gases.

Methane is derived from the anaerobic decay of organic matter such as in the digestive tract of livestock (25 per cent), paddy fields (35 per cent) and animal waste (12 per cent). Nitrous oxides are derived from land clearing — deforestation, fuel wood burning and use of mineral nitrogen fertilizers.

Temperature increase is not expected to be uniform. Countries closer to the poles will be the worst affected. Droughts and floods may be more frequent and intense with longer spells of dry and wet periods. Sea level is to rise by 30 to 50 cms by 2050 and by a metre by 2100.

This would mean salt water intrusion into ground water, disruption of aquaculture schemes, marginalisa- tion of certain irrigated, rainfed crop production systems and flooding of wetlands. With soil moisture reducing and temperatures rising, desertification will increase in some regions. The Sahel region of Africa will be further affected by a climate change. Between 1965 and 1985 Sahel went through long periods of drought. Some cold areas of developed countries, which have remained ice- bound are (with rising temperature) likely to be turned into new agricultural lands. This land, however, may be less fertile and less suitable for arable crops than land "lost" further south because of drier conditions. The north-south gap in agriculture production or production potential may widen.

Globally the total area under wheat and other tem- perature food crops (white potato, sugar beet) is not expected to vary significantly. But the FAO fears there would be substantial regional or sub-regional shifts in area and production potential that could undermine food security.

In all areas with Mediterranean climate, the water balance is likely to be negatively affected resulting in reduced discharge and irrigation potential of important rivers flowing through semi-arid areas. Northern Africa, South Europe and North of Central America may be headed for drier conditions.

In the Tropics, the rise in temperature will be less marked and may be accompanied by the weakening of the monsoon. This is expected to reduce highland areas currently suitable for temperate food crops.

The growth and yield of crops will vary. But high temperatures can induce pollen sterility in rice and wheat. By ensuring flowering in the early hours of the day, however, this risk can be reduced. Similar genetic changes are likely to affect cultivation of white potatoes and other food crops.

Climatic changes will affect insects, pests and weed growth. Higher temperatures and co-enrichment is expected to increase weed production.

Global marine fish production may be severely affected by climate change though individual fish stocks may suffer. Areas of high production may shift polewards. Inland fisheries, however, are likely to be affected by floods and droughts. Extensive shrimp and mullet ponds throughout Asia could be flooded.

Most of their hatcheries are situated close to the sea. Some 2.7 million tonnes of sea weed and 2.1 million tonnes of molluscs are cultivated in the shallow, inshore waters of Asia. Bangladesh, India, Malaysia and Thailand are rich in marine and aquaculture production but this may now be affected by flooding of coastal areas due to rising sea level.

While the annual rainfall is likely to increase, this is unlikely to compensate for the increased evapotranspiration and larger water demand expected in some areas because of rising temperature.

While working towards reducing greenhouse gases, FAO has pleaded for more efficient use of water. Improved water saving techniques where water is directly applied to the crop roots, water transport in closed conduits and comprehensive system monitoring and management, better water harvesting and soil conservation has been mooted.

An inter-agency action programme for water and sustainable agriculture development has been proposed.

As against these distressing portends for the futur the current trends for the coming year is far from depre sing.

With the south-west monsoon in Asia developi normally, the harvest of winter sown crops virtually co pleted and that of spring crops starting, the influence weather conditions on 1990 world cereal production diminishing and the global supply/demand outlook f 1990-91 continues to improve, says the FAO in its *Foo outlook,* September 1990.

For the first time since 1986, world production is like to be sufficient to meet estimated consumption and cu rent indications point to a record global cereal produc tion, reduced import demand and a small increase global stocks. Nevertheless, at the end of 1990-91 sea sons, global carryovers in cereals are still expected t remain close to the minimum FAO considers necessar to safeguard world food security.

Moreover, while stocks of wheat in the major expor ing countries are projected to increase, their holding of coarse grains will fall for the fourth year in succes sion and their aggregate stocks of cereals will no improve significantly.

But, reflecting the easier supply/demand situatio cereal prices are declining prices of wheat and low qua ity rice are around one-third lower than at the corres ponding time last year. By contrast maize prices remai higher reflecting the persistent tight situation for coars grains.

Crop prospects remain favourable in all major grow ing areas and FAO's forecast as of September 1990 of global cereal production in 1990 stands at a recor 1,941 million tonnes. This is nearly three million highe than projected in August and 66 million tonnes or 3. per cent above last year's output. Most of the increas in production will be in developed countries, but outpu in developing countries is also expected to show som growth. Compared to 1989, global production of whea is expected to increase by nine per cent to a record 59 million tonnes.

Coarse Grains

Output of coarse grains is forecast to increase by 1.5 per cent to 835 million tonnes and that of paddy by per cent to a record 515 million tonnes. Compared t August, the forecast for wheat, is two million tonne higher. The forecast for coarse grains is virtuall unchanged from August at 835 million tonnes. The fore

t for paddy production is also unchanged, reflecting normal development of the monsoon in Asia.

AO's current forecast puts world supplies of cereals 990-91 (production in 1990 plus stocks carried for-rd from 1989-90) at 2,065 million tonnes. This is three ion tonnes higher than estimated in August and ost three per cent higher than in 1989-90 mainly due an increase in production of wheat. Global supplies wheat in 1990-91 are expected to increase by nearly ht per cent to 707 million tonnes in August, but those coarse grains are likely to decline by around 0.5 per nt to 963 million tonnes, as the small increase in world oduction is more than offset by the lower 1990-91 ening stocks. Early indications are that global sup-es of rice could increase by about two per cent to 395 llion tonnes.

The harvesting of wheat in Asia is virtually completed. e region's 1990 output is provisionally estimated by AO at 199.3 million tonnes, slightly higher than the recast in August and some six million tonnes or three r cent more than last year. The increase reflects mper harvests in China, India and Pakistan.

The outlook for the main season crops of coarse ains is mostly favourable so far. Following generally undant and widespread monsoon rains in China, the ea planted to coarse grains in expected to have creased from last year, while the weather has been nerally favourable so far. Crop prospects also remain vourable in India. However, maize porduction in the ilippines is expected to be reduced due to adverse eather, particularly drought, early in the year. In Pak-tan, the danger of locust infestations to maize still per-sts.

addy Output

The 1990 output of paddy in the region is forecast at 75 million tonnes, nearly two per cent more than the revious year. The increase is expected to come largely om the two main producing countries in the region, hina and India. In China, widespread rainfall through-ut the growing seasons for the early and intermediate ummer/autumn crops is expected to result in improved ields, while early estimates of planted area point to a se of 1.5 per cent from the previous year; recent offi-ial reports confirm that a bumper intermediate crop has een harvested. In India, the paddy production target or the 1990 season is 110 million tonnes, four million onnes (four per cent) above last year; monsoon rains o far have been normal with good precipitation ecorded in most states, so that this target is likely to be achieved.

In Bangladesh, a bumper output similar to last year's production of 27.7 million tonnes is expected, while outputs are likely to rise slightly from the previous year in Cambodia, Laos, Myanmar, Pakistan and Thailand. Some shifts in the planting of the different types of rice are expected in Pakistan, due to recent changes in Government support price policies. The harvest outlook is somewhat less favourable in Indonesia, Japan, the Philippines, Sri Lanka and Vietnam.

In Indonesia, a marginal downturn from the previous year's output is expected due to pest infestations which affected the main season crop. The situation is more serious in Sri Lanka, where 1990 output is expected to remain below average after the sharp decline in the previous year. In Japan, the Government procurement price for rice has been lowered by 1.5 per cent and this together with the area diversion programme, is expected to result in a smaller planted area. In the Philippines, output in 1990 is targeted to rise above the 8.9 million tonnes harvested in the previous year; A "Rice Action Programme" has been launched to provide increased support to rice production, but financial constraints, especially as a consequence of the recent earthquake, has resulted in a further reduction in funds, which could hamper the realisation of this target. In Vietnam, the situation is currently uncertain as the planting of the 1990 main season crop has only just been completed; recent reports indicate a shortage of fertilisers, which could affect the current crop; last year, Vietnam harvested a record crop of 18.4 million tonnes, three per cent higher than in 1988.

The Food and Agriculture Organisation of the U.N. hit upon a truly tantalising theme for the World Food Day of 1990: Food for the future. The immediately preceding annual themes were devoted to exhaustive explorations of the nature and role of a particular section of the community or a specified element of the matrix, in relation to food and agriculture production — be it environment, rural youth, small farmers, fishermen, rural poverty or women in agriculture. Such a narrow beam, sharp pointed quest for the linkages and leverages that lend strength to the overarching global food security superstructure has no doubt its value, but it also carries with it the twin risks of the wood being missed for the trees and of the minutia of the present cluttering the pathways to the future.

Food security does not merely stand for adequacy of supplies through augmentation of production, although this indubitably is the first basic desideratum. Erratic pro-

duction patterns, supply imbalances and fitful availability without regard to the time and place of need can rob statistical claims of quantitative increases of much of their meaning and purpose. Stabilising supplies through stabilisation of markets, food reserves and arrangements to meet emergencies, and securing access to available supplies, especially for the part of the "bottom billion" of the world — the poor, the deprived and the disadvantaged — of whom 80 per cent or more live in developing countries, assume an importance equal to that of augmented production. In brief, if food security is to serve as an effective antidote to hunger and malnutrition, it should ensure that all people at all times have both physical and economic access to the basic food they need.

Grave Repercussions

The demands of the future, unless fulfilled, will have grave repercussions on the stability of nations and Governments, for the hungry are no longer willing to take their plight lying down; in other words, food security is going to get closely intertwined with national security itself. Also, food security is indivisible in that the insecurity of some will in due course engulf all, and so, the world, let alone a region or a group, cannot afford to live three fourths hungry and one fourth sated.

Leaving aside the future for a moment, how does the present look? In global terms, cereals production can be said potentially to be sufficient to meet emerging needs. In the last 20 years alone, there has been a spectacular rise in production from 1,103 million tonnes to 1,684 million tonnes. India more than tripled its production of foodgrains from 52 million tonnes at t became independent to a projected 178 millio this agricultural year. China, with approxim same cultivable area (140 million hectares) as with less land per capita (0.09 hectares a India's 0.22) and much less area under irrigatio lion hectares compared to India's more than 5 hectares) produced 391.5 million tonnes of fo in 1985-86 when India could touch only 16 tonnes. The panorama of possibilities is end dramatic opportunities are waiting to be seiz

According to one estimate, over the long haul rying capacity of the spaceship earth in nu human beings can be as high as 40 billions a developing regions not less than 30 billions w able high farming technology. Africa can sus said, with only a moderate increase in crop i population three times its present 500 millio absolute maximum of food production potent developing world, comprising Africa, Latin Ame Asia, has been computed at 36 billion tonnes (or its protein equivalent) each year. Add to this, covery of the Indian experience that farm pro is by and large neutral to the size of the farm, alluring prospect that beckons becomes irresi

Or, take fish harvesting: The World Confere Aquaculture (1976) projected a possible five-to- increase in aquaculture production by 2000, and by this standard, there should be no difficulty i ing to the call of the U.N. to increase the present lion tonnes catch to 115 million tonnes by 200

— T.P.S. K

CHEMARENA

L. VENKITESWARAN

Ethanol for fuel use

oblems with supplies of petroleum always lead to question of using ethyl alcohol as a fuel for motor cles. This is invariably ruled out in the Indian con- even if we claim to produce the lowest cost ethanol sugarcane molasses. The latest crisis in the Gulf again has reopened this question. It is reported that mmittee headed by the Minister is to examine the ntial for such usage. Some data on use of sugar- for ethanol have been indicated -- as 8 kl per hec- of sugarcane. The present idea seems to be to use nol in the farm sector as a substitute for diesel which acute short supply. On the other hand the Alcohol lucers Association wants the use of ethanol in the tional way, of admixture with petrol at 15 to 20% olume.

dia did have a pioneer programme for using eth- --power alcohol or 99.5% volume product -- in a mix with petrol over most of the North-west India e fifties. But the quantity was small as also our irements of petrol --at that time imported as the main eries were yet to be established. Sugar factory sses in the areas of UP far away from ports was ng serious problems in disposal. The country was ded to prohibition of consumption of alcoholic liquors olicy now prevailing only in Gujarat. In this context olicy of ethanol use in fuel (as 20% in petrol) was rced by law over specified notified areas with the ging cooperation of the foreign-owned oil compa- The logistics of movement of ethanol was solved e mixing being done at the various bulk depots h in turn supplied the mixture to the retail pumps. Government did not lose a rupee as taxation was e same level on alcohol as on petrol. The oil com- s lost nothing because they got the costs and same margin on the ethanol component of the mixture.

ngs changed quickly in the late fifties and early six- hen the potential of chemical usage of ethanol was ed and major programmes for such organic chem- and plastics took shape. The objective of prohi- was a joke in most states and the demand for le use began to hold sway and gobble up large nes of ethanol (rectified spirit) particularly by states which had little production inside their states. The supplies inter-state of rectified spirit ensured that there was no surplus anywhere after the limited chemical use also came up. It is in this context that the use of ethanol as fuel was totally withdrawn and the Power Alcohol Act also removed from the legislature. The producers began to concentrate exclusively on the rectified spirit of 95% volume which was adequate and the additional process of dehydration to 99.5% plus was discontinued, the equipment scrapped or diverted for other uses/expansions.

Hence at the present time there is only the 95% grade of rectified spirit which cannot be blended with petrol. So if ethanol is to be used as a motor fuel there is the need for large extra investments and complementary blending arrangments at petrol depots and if necessary some kind of legislation for compulsory use of the blend. It is also not clear if the newer Japanese design cars -- Maruti, the most used car -- can straightaway use the blend.

There is need to set our priorities right and devote all our efforts to obtain the maximum usage of ethanol as a chemical feedstock. Our sugar production has reached very high levels and may cross 15 million tonnes in the next few years. The potential for ethanol is in the region of 6,00,000 tonnes a year after meeting the demand, for potable use. While this can lead to between 3,00,000 to 5,00,000 tonnes of chemicals depending on the products, it is not significant in terms of our demand for motor fuel -- perhaps 10% of the total for India or 20% of the demand in UP and Maharashtra. The fuel use should have the lowest priority unless there is need to make and use Ethyl Tertiary Butyl Ether as a gasoline component for getting the required octane rating. There is also too much effort at exports of ethanol which should really be a stop-gap arrangement until new programmes for chemical use go on stream. Related problems on controls and taxation have to be resolved.

The era of ethanol as fuel will surely start in two decades cosidering the depleting oil reserves. For the present the chemical use should have precedence.

Drugs adulteration

We often read of adulterated, non-standard, spurious and even non-existent drugs in packs similar to the original or even in same bottles with labels, that plague the Indian market. Non-standard products and products filled in by mistake have led to several deaths in hospitals. The small scale sector has probably more such suppliers who corner contracts for supplies to hospitals with dire consequences to the patients. It must indeed be a problem for proper and adequate control and testing of the products. However this piece is on the international scene of spurious drugs as described in a recent issue of *Newsweek*. The picture in India may not be seen as alarming.

Newsweek refers to very important drugs such as Adria-mycin and Zantac in spurious packs marketed after several intermediates stages in different countries and finally marketed by reputable distributors who were probably unaware of what they were doing. In Nigeria it is reported that over a fourth of the drugs are fake. Italy was reported to be the headquarters of drug piracy but this was more the piracy of patent rights of foreign producers. In India we had a case of diethylene glycol replacing glycerine in medicinal syrups resulting in several deaths. This is apparently not uncommon and the *Newsweek* report refers to diethylene glycol substituting for propylene glycol in paracetamol syrup. In a ticular case of spurious drugs tracked down to its so it appears that the raw ingredients were from Turke Singapore and processed in Greece and pack counterfeit vials with identical labels and sold to a S broker who in turn supplied for sale to a Dutch di utor - of Zantac the anti-ulcer drug which only a vated the complaint not alleviated it. There are cases of vital drugs including the antiviral, adriar and even insulin. It is easy to cut down the dosa the repacking as this may not lead to any early m ings.

One problem is the high cost of the branded d -- sometimes as much as ten times actual costs generic product. Even simple drugs like paracetam ibuprofen sold in USA cost several times the pri India. But that is no justification for spurious and strength drugs. The world pharmaceutical industry w is a $150 billion industry has to sit up and take effe countermeasures and WHO may have to take initia India is fairly well placed and considering the vol of sales the adulteration or faking is of a low o --certainly less than in food materials or cosmetics other consumables. Even so, stringent measure quality control are called for.

Improved membrane for caustic soda

The membrane process is steadily taking over the electrolysis of salt to caustic soda/chlorine. Japan is in the forefront both in the changeover as well as in the technology for the membrane and cell designs. With nearly 30% reduction in electric power required as compared to the mercury cell and the steady rise in cost of energy the economics are weighted in favour of the membrane process but existing producers based on mercury cells, particularly in India have not been enthusiastic so far. Apart from higher costs for brine treatment to make it of the rigid specifications for the membrane cells, there has been the cost of conversion of a 35% lye to the required 50% -- thus neutralising the reduction in energy cost for electrolysis. Now there is a revolutionary new development by Asahi Chemical of Japan which results in the 50% lye direct from the m brane cell. It was surmised that the hydrogen for a layer on the surface whch decreased cell effici above the 35% level of caustic. Now Asahi have ad a layer of a proprietory product to the cathode sur which avoids this build up and enables direct pro tion upto 50% caustic soda lye. The membrane is ter FX50 and two of its "zero gap" electrolysers are clai to save energy with up to 50% concentration and a purer caustic of below 10 ppm chloride.

India will have to take up revamping of electroly wherever necessary and atleast adopt and use the uable designs from abroad and not wait years for i genous matching developments.

PHOSPHATIC UNITS

Centre rejects demand for compensation

The Union government has rejected payment of compensation to those phosphatic units which have shut down from January to March last year as a result of non-availability of imported raw materials, namely ammonia and phosphoric acid. The government is also unlikely to pay up for loss of production in the current year on account of similar shortages.

The fertiliser industry had demanded that the government should make up the losses of standing charges and profitability to the phosphatic units. The figure worked out for loss incurred last year was roughly Rs. 850 per tonne of finished product (diammonium phosphate) and a slightly lower figure for complex fertilisers.

The industry had calculated that the farmgate cost of a tonne of DAP produced indigenously on the basis of $432 per tonne (CIF) price of phosphoric acid was Rs. 6,100. As against this, the actual cost to the economy for importing a tonne of DAP on the basis of the weighted average of international prices for last year was only Rs. 4,800. In other words, for every tonne of imported DAP, there had been a saving in subsidy to the tune of Rs. 1,300 because the domestic phosphatic units were closed.

The strategy of importing DAP and not phosphoric acid and ammonia resulted in a foreign exchange savings of Rs. 40 crores. Therefore, the reimbursement of Rs. 850 per tonne demanded by phosphatic fertiliser units would have, far from increasing the subsidy burden, resulted in savings in subsidy as compared to what would have had to be paid in the event of continued production, it was argued.

The Union government argued that in the current year, the fertiliser industry does not have a case for asking for compensation. This is because of the relative price movements of phosphoric acid and DAP in the international markets.

By rough estimates, the foreign exchange savings by importing DAP instead of acid will not be much. In fact, C & F per tonne prices prevailing in the third week of October for DAP, phosphoric acid and ammonia were $228, $396 and $174 respectively (ammonia is mixed with acid to produce DAP). According to these prices, the value of domestically made DAP works out to $226.62 — about $1.38 cheaper per tonne. But in the last month the relative price of acid has gone up faster than DAP prices, making DAP imports cheaper. But in any case, the differential of Rs. 1,300 will be considerably narrowed.

Thus, there is no question of substantial foreign exchange savings, or savings in subsidy that could be reimbursed to the affected phosphoric acid units. Then again, in the context of the severe foreign exchange crunch, savings in hard currency, however small, is worthwhile. The fertiliser industry has argued that there is "real and social costs" involved in keeping domestic plants closed, and unless the foreign exchange savings is not of a high order, the government should import phosphoric acid and ammonia and not DAP. Under the present circumstances, there is atleast a strong case of compensation of last year's losses.

In all, the total requirement for phosphoric acid for the entire year is to the tune of 16 million tonnes. Against this, only nine lakh tonnes have been imported. Domestic units have already started closing down, and they are likely to remain shut till the end of the current financial year. The affected units are the Kandla unit of IFFCO, the Goa plant of Zuari Agro, the Madras plant of MFL, the Sikka unit of GSFC, Hindustan Lever's Haldia outfit, Para Phosphate's plant at Paradeep, MC Mangalore plant and the Tuticorin Alwaye plants of SPIC and FAC

CAMPHOR PRICES SHOOT U BOMBAY

The price of camphor has record sharp rise in the Bombay market du the last three weeks, following irreg supplies of stock from the manufac ers. As the prevailing price of camp in Bombay market is at such a lucra level that the traders from other st are attracted to despatch the stock Bombay market to sell at higher pri

According to tabletiers, the short of camphor powder, at present, has them in hardship as the camphor pow is the basic raw material for their tories to make the tablets of camp from it. The tabletiers allege that t are compelled to buy the camp powder from the local market wit premium of Rs. 5 per kg because non-supply of their regular orders by manufacturers. They have alre placed an order for the stock in beginning of November which unfortunately not been supplied so by a leading camphor powder manuf turer. In the local market, the camp powder of C.A.P. is sold at Rs. 110 kg against its official selling price Rs. 105 a kg.

According to the information av able, camphor powder from other sta particularly from Delhi is frequen offloaded in the Bombay market o large scale, which is possible beca of vast variation of taxes between states. Of course, the packing of goods coming from the other states quite different from the goods suppl locally by the same company. Acco ing to the tabletiers, they are not rece ing supply of camphor powder regular basis from the manufacture but on the contrary, they have to pay amount against the delivery order wi out any credit facility.

Industries should make public, information on likely hazards

Managements of chemical and allied industries should not shun the media or voluntary agencies in making public, information about various hazards likely to occur in the industries, the Tamil Nadu governor, Mr. Surjit Singh Barnala said on December 10. Inaugurating a five-day international workshop on "hazard assessment and disaster mitigation in petroleum and chemical process industries" at the Central Leather Research Institute (CLRI), Madras, he said it was the industry's bounden duty to provide such information to society at large.

He said this was not to create a "panic situation" but rather to avoid one during emergencies. Referring to the 1984 Bhopal gas tragedy, the governor said the confusion about what the gas was and whether it was toxic had inhibited the search for an antidote. "When some doctors proposed sodium thiosulphate, the doctors of Union Carbide advised against it", he said.

Mr. Barnala said though ICMR studies in 1985 had concluded that MIC gas exposure lead to cyanide poisoning, Union Carbide held that MIC could not enter the blood-stream and could at the most cause varying degrees of local injury. Mr. Barnala expressed regret at reports that the company, even after the disaster, did not give vital information regarding the thermal decomposition of MIC or the identity of the components of the toxic emission and antidotal treatment.

Had systematic and appropriate information been available, people's suffering could have been reduced, he said. Calling for more attention to training of employees in safety measures and inculcating in them a good management policy responsible to safety needs, Mr. Barnala said according to some experts, the Bhopal tragedy could have been averted if the management had ensured that at least two of the five preventive devices were in perfect order.

It was reported that some of the systems in the company were in bad repair and that when the pressure in the storage tank rose beyond the tolerable limit, the value leading to the spare tanks was not opened, he said. Referring to the R.K. Garg committee appointed soon after Bhopal by the Maharashtra Pollution Control Board, Mr. Barnala said it had noted that some operators present in the plant's shopfloor "were not conversant with safety devices and procedures for handling abnormal operational problems".

Safety rules had been provided by the government, but there was a need to train and equip enforcement authorities. The Commonwealth Science Council (CSC) secretary, Mr. G. Thyagarajan, said CSC's industrial support programme had established an initiative that incorporates new knowledge and technology applications to enhance operability and productivity of industrial processes.

Presiding, the director general of the Council for Scientific and Industrial Research (CSIR), Dr. A.B. Mitra, said the inter-laboratory thrust within CSIR in the area of disaster mitigation had started in a big way after the Bhopal tragedy. A major weakness was the non-availability of a good data base. Building one should be the first priority. Dr. V.C. Pinnagoda from the International Labour Organisation, Geneva, which has sponsored 15 international participants for the workshop, said the proposed tripartite international legislation by June 1992 would further enhance global efforts at prevention of global accidents.

Mr. Malhotra said each year 1,000 to 2,000 new chemicals entered the market, adding to the 70,000 to 80,000 already existing. Many of these ent without adequate evaluation of t effects, he said, adding that in the de oped countries, it was no wonder the demand for "greening of indust was targetted on chemical industry

Developing countries in partic were likely to suffer "serious effec from any disaster as they had "li capacity" to evaluate the environmer impact of imported products, he sa and called for an international syst to control trade in dangerous chemic and chemical wastes. If developi countries were to avoid repeating t industrialised countries' mistakes a "leapfrog" to sustainable industr development, the former need access 'clean' technologies, he added.

A CSC manual and guide book o "methodologies for risk and safe assessment in chemical process indu tries", written by Dr. K.V. Raghava deputy director, Central Leathe Research Institute, Madras, an Mr. A.A. Khan of the Indian Institut of Chemical Technology (IICT Hyderabad, was released on the occa sion by Dr. S. Varadarajan, former chie consultant, Planning Commission.

Speaking to the press about the work shop Dr. G. Thyagarajan, secretary CSC, said that India was emerging a a leader in the field of risk analysis. The spurt in development in this field came after the Bhopal disaster, he said, adding that now Indian companies were very much alive to the question of industrial safety, and public awareness too was high.

The subject that will be discussed in the 11 technical sessions of the workshop are: Hazardous chemical reactions, consequences of thermal and explosion hazards, analysis of thermal initiated cascade or domino effects, hazards of toxic gases and their impact on environment, hazard and operability studies and their application in chemical plants, risk assessment of chemical plants and

nore installations, hazard warning control and disaster mitigation and rgency preparedness and manage- t. The workshop will also have, in tion, popular talks for the benefit of general audience. An orientation rse has been held for four days in paration for this workshop to provide opportunity to the participants to iliarise themselves with the conven- al techniques of hazard assessment disaster mitigation. Speaking of the ertise within the CLRI, or risk anal- s, Dr. R.B. Mitra, director of the itute said that CLRI's cell for indu- al safety and risk assessment SRA) had an excellent track record assessing ongoing risks and also in king safety an intrinsic factor in nts that are being planned.

The CISRA has conducted maximum cident analysis studies for a number petrochemical and hazardous chem- l industries like ONGC, IPCL, and the entire industrial area near adras. Issues identified for the inter- tional workshop are the environ- ental impact of chemical accidents, ternational trends in safety, national d fiscal policy issues in planning of w industries.

HORTAGE OF LIFE-SAVING RUGS FEARED

All banks' insistence on depositing 0 per cent margin money for opening tters of credit will lead to a shortage f life-saving drugs, it is feared. Drugs nd pharmaceuticals have been exemp- ed in the Reserve Bank directive on argin money. However, bank officials re not sure about what items come nder this definition. As per the gov- rnment's definition, both bulk drugs nd pharmaceutical formulations come nder the definition of "drugs and harmaceuticals".

However intermediates used in the anufacture of bulk drugs are not clas- ified as drugs or pharmaceuticals. In he absence of classifications, some banks are also not exempting bulk drugs. Though India is almost self-sufficient in most bulk drugs, vital intermediates are still being imported. The import content in bulk drug production is estimated at more than 40%. Most units stock two to three months inventory. This necessitates an increase in working capital requirements to the tune of 150 per cent (calculating margin money for three months imports).

CAUSTIC SODA INDUSTRY HAILS CHANGE IN EXCISE DUTY NORMS

The Union government has changed the norms for levying excise duty on caustic soda lye from 15 per cent ad valorem to Rs. 1,300 per tonne. At present there is an additional specific duty of 5 per cent on all grades of caustic soda. Thus, the total duty element would now amount to Rs. 1,365 per tonne as against Rs. 1,339 previously. The manufacturers of caustic soda have generally welcomed the change. This is in spite of the fact that the net incidence of duty will be higher by Rs. 26/tonne

It will be preferable to pay the same, according to the manufacturers, as it would reduce the paper work and would also mean less number of disputes with the excise department. Caustic soda is manufactured in lye, solid and flake forms. Production of all these grades during 1989-90 was 9.54 lakh tonnes.

However, the lye form accounts for the bulk i.e. 80 per cent, of production. Flake and solid varieties are manufactured by further processing the lye variety. Hence, their cost of production and consequently the market price are higher than the lye variety. The solid and flake varieties are currently quoted around Rs. 10,000 to 11,000 per tonne. The excise duty on flake and solid varieties was already changed to Rs. 1,300 per tonne in March this year. Thus, all varieties are now charged a uniform duty.

CFBP award for Ashok Organics

At an impressive ceremony at the prestigious Durbar Hall of Rajbhavan on Monday, the 3rd December, Hon'ble Shri C. Subramaniam, Governor of Maharashtra presented the Council of Fair Business Practices (CFBP) Award for Medium Scale Manufacturers to M/s. Ashok Organic Industries Limited. Shri Ashok M. Kadakia, chairman and managing director received the award on behalf of the company. Dr. Anil M. Kadakia, joint managing director and Shri Pankaj M. Kadakia, joint managing director were also present at the occasion.

The following is the citation awarded to Ashok Organic Industries Ltd.

"Established in 1975 as manufacturers of alcohol and alcohol-based products, such as acetic acid, acetic anhydride, glycine, paracetamol etc. all used by numerous industries. The annual production is Rs. 25 crores. They believe in quality, safety, reasonable prices and prompt attention and service to their customers. Every year, they plan interactions with the customers. Their project division has successfully completed construction of four major plants and now the fifth project is nearing completion. As a part of their social commitment, they have started a Student's Hostel at Devgad Baria for Adivasis (scheduled tribes) and economically backward students. An Arts & Commerce College was started in 1988."

Other award winners included M/s. Glaxo India Limited (Manufacturers-large), M/s. Sharp Industries, Coimbatore (Manufacturers-small), M/s. Shanghvi Modi & Co., Bombay (Traders, medium), M/s. A.K. Rai & Co., Jabalpur (Traders, small), and the Bombay Sugar Merchants Association Ltd., Bombay (Association).

Glaxo honoured among large manufacturers

Glaxo India Limited, were honoured for their strong commitment to the invention, development, manufacture and marketing of safe, effective medicines of the highest quality. The citation read out in their honour, read (in part) "The main thrust in support of the cause of the consumer has been to educate him and enhance his awareness. They have a commitment to the health-care business and to quality and safety of their products and operations. They aim at providing satisfaction to their customers, a continual reasonable return to their shareholders and a fulfilling job-security and secured future to their employees. They recognise their duty to contrib towards the goal of improving natio health. They have taken effective st to discharge their social responsibili by helping weaker sections and the h dicapped, thus contributing to the co munity welfare."

Shri Ashok M. Kadakia receiving the CFBP Award

About the council

The Council for Fair Business Pr tices was launched as a movement 2nd October 1966, on the birth ann ersary of the Father of the Nati Mahatma Gandhi. It propounded t responsibilities and obligations of indu try and trade to the consumer, and tri to build bridges of understandi between manufacturers and users. T main objective was to implement se regulatory measures for the busine community coupled with the aim codifying the existing fair trade prac ces and setting up an effective machi ery for their implementation in organised manner in order to crea greater goodwill and public confiden in the business community.

Code of fair business practices

Every member of the Council accep the following fundamental obligation

1. To charge fair and reasonable price and take every possible step to ensur that the prices to be charged to th consumer are brought to his notic
2. To take every possible step to ensur that the agents or dealers appointe by him do not charge prices highe than fixed.
3. In times of scarcity, not to withhol or suppress stocks of goods with view to hoarding and/or profiteering
4. Not to produce or trade in spuriou goods or goods of standards lowe than specified.
5. Not to adulterate goods supplied.
6. Not to publish misleading advertise ments.
7. To invoice goods exported or impor ted at their correct prices.
8. To maintain accuracy in weights and measures of goods offered for sale
9. Not to deal knowingly in smuggled goods.

Industrial alcohol decontrol sought

The All-India Distillers' Association (AIDA) has approached the Industry Ministry once again with a proposal to decontrol molasses and industrial alcohol. Sugar mills and distilleries are pushing the proposal on the ground that the country has and will have a net surplus of both molasses and industrial alcohol and price realisations for the sugar mills and distilleries are very low.

Currently, price and distribution controls exist on both molasses and industrial alcohol although both these controls are not enforced efficiently by some state governments. The argument of AIDA is that price realisation from the chemical industry is very low as sugar mills and distilleries are supposed to sell the molasses and alcohol at prices fixed by the Bureau of Industrial Costs and Prices.

Export realisations can be quite attractive both for distilleries and for the government in the context of the current foreign exchange crisis. In fact, there is a worldwide shortage of both molasses and alcohol and prices have firmed up. Sugar industry circles feel that there will be an exportable surplus of 5 lakh tonnes to 10 lakh tonnes of molasses every year from now judging by the current uptrend in sugar production.

The price of molasses in the international market is almost seven times as high as the price fixed by the government — Rs. 120 per tonne. The alcohol-based chemical industry fears that in case of total decontrol of molasses and industrial alcohol, most of these chemical units would be forced to close down as there would be large-scale export and diversion to the potable sector.

As it is, chemical units in alcohol-deficit states like Gujarat, Karnataka, Andhra Pradesh, etc. are not getting the required supplies of molasses and a hol. As a matter of fact, a numbe alcohol-based chemical units are w ing below 50 per cent of their insta capacity in these states.

Inter-state movement of alco meanwhile, has come to a virtual in the country with the imposition various state levies by the two sur states — Uttar Pradesh and Mahar tra — on alcohol purchases by ch ical units of other states. Indu sources at Bombay point out that U Pradesh will have at least 600 lakh l of surplus while Maharashtra will 200 lakh litres in the current seas

And if the four new chemical come up as planned this year, there hardly be any surplus in Mahara this year. A total decontrol would m that the state governments will hav authority to allocate the available hol between chemical and po sector. And it is possible that the e production of alcohol may be div to the potable sector, the chem industries fear.

AIDS VACCINE TO BE TEST IN THIRD WORLD

Though AIDS kills more peop the west, people in developing cou will be used for the first large- human trial of AIDS vaccine, now developed in the west, as soon as ready. The WHO had announc early 1991, that its teams will potential vaccine field trial sit developing countries. The orga tion's press release said that at three sites will be selected during After that, WHO will send equip and supplies to the selected devel countries and provide training to scientists for conducting the trial WHO said that the decision to id suitable developing countries fo vaccine trial was taken at a Nov meeting in Geneva at which spec from industrialised and devel countries were present.

Detergent manufacturers urge tax concessions

e Small Scale Detergent and Soap facturers Association has made a nt plea to the West Bengal State rnment to modify the sales tax s to make the detergent industry ed in the Eastern part of the coun- ompetitive with those units in the f the country, and particularly in arashtra and Gujarat.

augurating the Annual General ing of the Association held on nesday, the 5th Dec., 1990, at Cal- Dr. Bikram Sarkar, Commissioner ecretary, Commerce & Industry, . of West Bengal, in his speech sed that the small scale detergent stry of West Bengal will get all the necessary to revive this industry its present insignificant status. arding Haldia Petrochemicals, Dr. ar said that they are seriously think- to introduce some of the down-stream chemicals for the benefit of the small scale industry of West Bengal.

Shri A. Ray, Director, Small Industries Service Institute, Government of India, Calcutta, expressed his all out support for the small scale detergent industry of West Bengal. He also said that his institute could help in exporting detergent powder manufactured by the small scale industry.

Shri A. Sen, Managing Director, West Bengal Small Industries Corporation, in his observation, said that the small scale detergent industry of West Bengal is handicapped compared to their counterparts of Western India on many counts, therefore they deserve help and support from the State Government.

Shri C.R. De, Regional Manager, National Small Industries Corporation, informed the gathering that the NSIC has been trying to market detergent powder under a common brand name through the Public Distribution System.

Earlier, in his presidential address, **Shri Dipak Kumar Mitra,** President, The Small Scale Soaps and Detergents Manufacturers Association, painted a grim scenario of the detergent industry in the Eastern region. The following is the text of his address:

"Respected Dr. Bikram Sarkar, Shri Achyut Ray, distinguished guests and friends,

On behalf of the Small Scale Detergents & Soaps Manufacturers Association and on my own, I have immense pleasure to welcome you all to this Annual General Meeting of the Association which is the apex body of the small scale detergents and soaps manufacturers in the eastern region of the country.

It is indeed a proud privilege and honour for us to have Dr. Bikram Sarkar, Commerce & Industries Secretary of West Bengal Government amongst us on the occasion of the Annual General Meeting of the Association. Dr. Sarkar is known as an administrator of dynamism, dedicated to the cause of industrial development in West Bengal. He is the key-figure behind the speedy implementation of the Haldia Petrochemical project. Time and again the industry has taken the shelter of Dr. Sarkar and he always extended his helping hands to solve the just problems of the industry with positive results. And on this ground the small scale detergent industry in West Bengal will not be denied of his blessings to solve its chronic problems.

Shri Achyut Ray, has recently taken over as the Director of the Small Industries Service Institute of the Government of India as the able successor of our beloved, Shri N.K. Guha. But by this time Shri Ray has proved his keen interest in the multiple problems of the small scale industry by conducting dialogue with various sectors of the small scale industry to identify its basic problems. We wish him all success in this venture.

We are meeting at a time when the industrial scenario of West Bengal as also of the whole country is passing through a crucial period. To overcome this our beloved Chief Minister Shri Jyoti Basu as well as the new Prime Minister have taken several remedial measures to revive the industrial health of the country. We, the people in the small scale industry earnestly hope that there will be greater interaction between the Government and the industry, especially the small scale industry to achieve the common goal in bringing back West Bengal to its pride position as one of the leading industrial states of the country. Please allow me to turn to the detergent industry which is the vital sector of consumer goods industry in the try and now stands at the cross-r

As far back as in 1957-58, synt detergent was first introduced i country with a modest productio only 57 tonnes produced by a few nised units. Soon the fabric was market of the country underwent a revolutionary change and the us detergents gradually became popul washing media in the domestic se Its pick-up was so speedy that by beginning of 1970, the total annual duction of the detergent industry up to 70,000 tonnes and by 1985-8 production touched 6.25 lakh ton Today this industry is considered t one of the fastest growing industr India and it is estimated by the w ing group on oils, soaps and deterg in the Seventh Five Year Plan that demand for detergents would to 11.13 lakh tonnes by the end of 1 and would contribute 50 per cent of total market of washing materials. F

ore, the Planning Commission indicates that the total demand for ents in the country would se to 25.5 lakh tonnes by the year nd would contribute 60 per cent total washing material market. astern Region of the country alone nated to contribute around 16 per f the all India market for deter- which was roughly 1.0 lakh tonnes 85-86. It is estimated that by the this decade the demand for deter- in the Eastern Region would be tune of 1.78 lakh tonnes and by AD, this would increase to 4.08 onnes.

nificantly, the small scale sector ntributing approximately 70 per f the total detergent production in untry. It is interesting to note that e overall 20 per cent annual al growth during the last Five Plan, the small scale sector of the gent industry has achieved an aver- growth of 28 per cent against the th of 13 per cent by the organised r.

nfortunately, while there has been pendous growth of the detergent stry on all India basis, there has virtually stagnant growth of this stry in the Eastern Region of the try, particularly in West Bengal o various problems and constraints. t of the small scale detergent and manufacturing units in West gal are heading towards sickness are almost on the verge of extinc- This dismal picture of the Eastern on does not match with the national vth of 20 per cent in the detergent stry which comprises of 13 per cent vth in the organised sector and 28 cent in the small scale sector. As a er of fact, the production of the nised sector of the industry in the ern region of the country was only nd 30,000 tonnes in 1985-86 and small scale sector mainly concen- d in West Bengal produced hardly 00 tonnes of detergents. The gap veen demand and production in this part of the country during 1985-86 stood at 60,000 tonnes and is likely to shoot up to around 1.2 lakh tonnes by 1990. This shortfall is being met mainly by the small scale detergent units of Gujarat and Maharashtra.

Recently prices of basic raw materials required for production of detergents have been increased exorbitantly but with free availability in the markets, and this is just the right time to give the small scale detergent industry in West Bengal the boost that it rightly deserves to make it in line with our counterparts in Gujarat who enjoy immense advantages like:

— Lower raw material costs on account of bulk purchases to the order of 5 to 10 per cent and very nominal freight charges to the order of 6 to 8 per cent, and

— Lower sales tax on finished product, i.e. CST @1% as against the normal 4%, and local sales tax @6.5% as against West Bengal sales tax of 8%.

In a series of memorandam to the Government for the last couple of years the Association has shown that the cost of standard washing powder produced in West Bengal when sold in the Eastern Region of the country is around 0.80 paise per kg higher as compared to the washing powder produced in Gujarat, on account of the various benefits that are being enjoyed by the small scale units in Gujarat. This calculation is prior to the recent hike in basic inputs. The revival of the small scale detergent industry in the Eastern Region of the country as a whole and West Bengal in particular has been discussed at various forums and seminars in the past and we reiterate that to counteract the immense advantages which are being enjoyed by the small scale units in Gujarat, it is high time for the Government of West Bengal to allow some concessions to the ailing small scale units in West Bengal in the form of: concessional sales tax tariff or to treat the industry at par with the small scale soaps industry which is

exempted from paying the West Bengal salex tax; and subsidy in basic inputs, since recently, these have been increased exorbitantly due to oil crisis in the Gulf.

If these concessions are given to the small scale detergent units in West Bengal, ultimately it would not result in any revenue losses to the exchequer, since the present production tonnage of the small scale detergent units in West Bengal is negligibly poor as compared to the possible tonnage that can be achieved, whereby the revenue on account of the sales tax levied on the raw materials inputs @2 per cent and octroi duty @2 per cent together, would be much higher as against the revenue earned by the State Government presently on account of 8 per cent local sales tax on detergents. Incidentally, I may mention that the Government of Gujarat, for the purpose of boosting the industry in that state, has given further concession to the small scale detergent industry since the middle of 1987 in the form of 1 per cent Central sales tax, on their sales outside the state. Here in West Bengal, we have to pay 4 per cent Central sales tax. This is a single instance as to why small scale detergent units do not get their market even in West Bengal in comparison to the products of the small scale detergent units of Gujarat. For Gujarat, West Bengal and rest of the Eastern Region have become a dumping ground.

In several occasions the Association has appealed to the Government that the detergent products of the small scale units in West Bengal should be marketed through the Public Distribution System. The products would conform to the appropriate quality standards. This would, at the same time, enable the common man both in the rural and urban areas to get a quality product at reasonable prices.

National Small Industries Corporation Limited, an organ of the Go ment of India, volunteered to fo consortium of the members of the ciation and market detergent pro under a common brand name. C man of the NSIC, Shri S. Juneja taken special initiation to implemen project. We hope that in the lon NSIC will solve the acute mark problem of the small scale dete units of West Bengal.

In view of the fact that several le of intents have been issued for se up of linear alkyl benzene plants in ing one to Hindustan Lever Limited of the said plants should be set u Haldia to meet the requirements o Eastern Region.

Immediate actions should be take produce soda ash, a basic raw mat for detergent products, at the Hindu Fertiliser plant at Haldia to meet region's requirements. Ethylene o a raw material for the productio

non-ionics should be identified as one of the downstream products of the Haldia Petrochemicals project, to boost up the industrial development and growth of this region.

The West Bengal Small Industries Corporation Limited has all along stretched its helping hands to the small detergent units in the State in various forms like allotment of lands, raw materials like palm fatty acid, under it's most able and sympathetic managing director, Shri Ardhendu Sen. He has been trying his best to get allotment of trisodium phosphate, a scarce raw material, from the Indian Rare Earths Limited, for distribution on fair-price to the small scale detergent manufacturing units. Shri Sen may kindly take positive steps promptly so that more needy units might be provided with lands/sheds in outskirts of the city for setting up new units or shifting the existing ones.

Whereas everyone present here today keenly look forward to restoration of the lost industrial glory of West Bengal, I sincerely hope that the problems and constraints of the small scale detergent industry here would receive due attention by high Government officials like Dr. Bikram Sarkar, Shri Achyut Ray and others. They have all along supported the just cuases of the industry and I appeal to them that the time is ripe for revival of this ailing industry. Further delay in taking remedial steps by the West Bengal Government to the problems of this industry will only remove the name of this State as one of the contributors of important consumer items like detergents. Consequently the exchequer will lose its revenue and unemployment problem will increase.

I am grateful to Dr. Bikram Sarkar for graciously accepting our invitation to inaugurate our Annual Session and having taken great interest in this particular industry. I assure you Sir, that given the right support, the members of the Association would prove b doubt that the Small Scale Det Industry in West Bengal is capa producing incredible results a second to none in this sub-contir am also thankful to Shri Achyut Director, Small Industries Service tute, Government of India, honou guests, members of the media an members of the Association for t pains to grace our Annual Sessio giving me a patient hearing.

Before I conclude, I shall be fa in my duty, if I do not express my h felt thanks to all my colleagues i Committee of the Association in pa ular the members of the Associati a whole for their unstinted suppor wholehearted cooperation wit which I could not discharge my I idential duty so smoothly during tenure. I also place on record my appreciation for the Secretariat of Association which readily responde the call of the hours with high ef ency and positive result."

EOU FOR REGENERATED M AT NASHIK

A unique export-oriented unit is ing set up at Sinnar, Nashik distric Maharashtra. It will import poly scrap from United States and reproc the material for export back to An ica. The new unit is being promoted Avikem Resins Ltd., a company m ufacturing industrial resins and ad sives. The EOU will be a joint vent with Alaric Inc. of U.S. to manufact 6,000 tonnes per year of regenera methyl methacrylate monomer (po larly called acrylics).

Alaric is a leader in recycling acry wastes. According to Mr. Vinay Govil, chairman and managing direc of Avikem, Alaric has over the ye developed knowhow for recycl acrylic scrap (called Alaric's process) regenerate virgin grade MMA mo mer to obtain the maximum possi yield. This will be the first project of kind in India.

Plastics panel mooted

view of the likely growth of the industry, which is poised to grow folds in the near future, a Plastic mission on the pattern of the Elec- cs Commissions has become a sity. Experts have underlined the for urgently constituting a Plastic mission to coordinate the growth s industry, which is employment- sive and offers great export poten- The Plastic Commission, it is felt, study the technologies available ad and help the Indian industry to ct appropriate ones. In the wake of al socio-economic changes taking , the demand for plastic products by the consumer as well as the pro- r sectors are likely to grow at a faster rate.

s far as the growth of the plastic stry is concerned, the number of essing units have risen from 6,500 80 to more than 13,500 in 1990 and expected that by the turn of the cen- the number of such units would to around 22,000. The investment e processing industry is of the tune ,325 million, which is expected to ease by 125 per cent by 2000 AD. processing industry at present has capacity of more than 1,50,000 es of material, which is expected to p by 200 per cent by the turn of the ury. The industry is also employ- t-intensive and is likely to provide loyment to around 20 lakh persons 000 AD. More significantly, the set- up of petro-chemical complexes ld result in proliferation of the plas- processing industry in every nook corner of the country.

uch a step will not ony help in tech- gical upgradation and increase orts of finished products, but will help the Indian plastic industry to t itself to the fastchanging industrial ironment. The plastic industry is cially important in the Indian con- , because it has the potential for acing scarce metals, wood, leather a number of other items.

The plastic industry in the country, which started with simple technolgoy for manufacturing household items is now making high precision items. The industry is also producing a variety of items like furniture, electronics, telecommunications electric cables, medicare items, processing and packaging, footwear, agriculture implements and pipes for distribution of potable water and irrigation purposes.

The plastic industry has also contributed to the success of the 'green revolution' in its own way by manufacturing products for canal lining, water sprinkler systems etc. The plastic industry has also done well on the export front. The export went up from Rs. 47.94 crores in 1980-81 to Rs. 74 crores in 1985-86. The exports are expected to be around Rs. 150 crores by the end of the Plan. It is also estimated that with the development in technologies and qualitative change in the end use, the industry will record a growth rate of 12 per cent during the Eighth Plan period. Also the growth of plastic footwears will help in increasing leather goods exports, indirectly adding to country's total exports.

Realising the importance of this industry, the Government has accorded it the status of 'sun rise industry'. However, the experts feels that this alone is not enough. The industry requires a congenial atmosphere coupled with favourable policies for its vertical and horizontal growth. It is felt that the elctronics industry got a boost by way of significant policy support. However, the same did not happen with the plastic industry. In this regard, the experts argue that a Plastic Commissions could be of great help by way of giving a proper direction to the industry.

COMPETITION BETWEEN JUTE, SYNTHETICS GROWING: FAO

With the full impact of the Gulf crisis yet to be felt, competition between jute and synthetics has increased in recent times. This was the conclusion of a session of the UN Orgnisation viz. the Food and Agriculture Orgnisation (FAO) held recently in Rome. According to the chairman of the 26th intergovernmental session of FAO, Mr. R.N. De, global capacity for producing polypropelene (PP), one of the key inputs for producing synthetic goods, would increase by 19 million tonnes by 1982.

This would mean a 14 per cent growth rate for PP between 1988 nd 1992, Mr. De said, adding that most of the planned increase in capacity was expected to be in the Gulf region. Mr. De, who is the jute commissioner, said that while global production of jute rose to 202 lakh bales in end July 1990, (the jute season ends in July) as against 172 lakh bales in the prevous season, world import of jute goods fell by three per cent with the West Asian countries accounting for a major decline.

While emphasising the possibility of increasing competition in the very near future Mr. De said the session noted that the impact of the Gulf crisis was yet to be felt on the intermediate petrochemicals proudcts, as there was some inherent time-lag.

He said that import of jute fibre increased by 20 per cent with Bangladesh accounting for 80 per cent of the imports.

In view of the immediate threat from synthetics, there was an urgent need to promote diversified jute goods on one hand and on the other, highlight at every possible forum the environment superiority of natural fibres over synthetics.

According to a West Germany-based organisation: Environment Protection Encouragement Agency which was appointed by FAO, jute stood out vis-a-vis other synthetic materials as being far less damaging to the environment during the respective life cycles of these two materials.

SHIFTING OF INTERMEDIATES TO RESTRICTED LIST

PVC manufacturers in a quandary

Vinyl chloride monomer (VCM) and ethylene dichloride (EDC), intermediates for making PVC, have been shifted to the restricted list of the import-export policy. This has created a quixotic situation whereby the government encourages the import of the finished product (PVC, which continues to be on the OGL list) and discourages the import of intermediates by local PVC producers.

The move is the result of the government's decision to shift items falling in the residual list (those not specifically listed in Appendix 6 list 8 part I and II) to Appendix 3-A with a view to curb foreign exchange outgo.

According to industry sources, there is a difference of $250-300 per tonne in the foreign exchange outgo on the two intermediates and PVC. The production of PVC by DCW Ltd. is based entirely on imported VCM. To make up the shortfall in the availability of alcohol and chlorine, Chemplast Ltd. of Madras also imports EDC and VCM to supplement its own production of these intermediates.

Even National Organic Chemical Industries Limited (NOCIL) and Indian Petrochemicals Corporation Limited (IPCL) occasionally import EDC depending on indigenous availability of ethylene and chlorine. About 50,000 tonnes of PVC per annum is indigenously produced from imported EDC/VCM out of a total production of 1,30,000 tonnes a year.

The current demand for PVC is about 2.5 lakh tonnes. The gap of about 1.2 lakh tonnes between indigenous production of 1.3 lakh tonnes and the demand of 2.5 lakh tonnes is met by imports.

Imports are not only under OGL for actual users but also allowed for stock and sale. On a production of 50,000 tonnes of PVC from imported EDC/VCM, there is a net foreign exchange saving of about Rs. 25 crores a year.

There is no indigenous EDC or VCM available for sale as all EDC and VCM produced is captively consumed by polyvinyl chloride manufacturers. In order to increase indigenous availability of PVC and to make up for the shortfall in the availability of ethylene and chlorine (due to power cuts), import of the two intermediates under OGL was recommended by experts like D.V. Kapur.

Imports of the two intermed now force manufacturers to ap import licence. Apart from th some licensing procedures, th complicated because the two are not available off the shel for advance planning of two months besides specialised oc vessels and port facilities. Sto lities are also limited.

The PVC resin manufactu ciation has urged the gover expeditiously clear applica import licences so that units do down. At the same time, it has government to shift the two i to the OGL list as long as PV on the OGL list.

Associations representing t sing industry too have backed posal. The producers body requested the government to a pliers' credit on imports with help the government tide immediate problem of foreign squeeze.

The government's decision import of EDC/VCM may als the prospects of Reliance Pe cals and Finolex, both of v planing to set up polyvinyl plants based initially on impo stock.

yundai all set to bag Panna project

Korean giant, Hyundai Heavy ies (HHI), is all set to bag the oilfield development project. The um ministry which opened the id on Dec. 3, found the Koreans g a very attractive amount of just 80 million for the process plat- complex. HHI is the only bidder e project. The bid has been sent steering committee of the Oil and al Gas Commission (ONGC).

e development of the Panna oil- was cleared by the government in st this year with a total cost of 149 crore. The project consists of well platforms, one process com- flow lines and drilling of 69 deve- ent wells. The tender for the pro- was initially floated three years in November, 1987. The bidders TGP of France, MDL (India) and HHI was then considered as tech- ly best and had also quoted the st. The price quoted at that time US $250 million. However, orders not placed on HHI due to a strike e Korean company's yards and cer- audit objections on an earlier order.

HI subsequently increased the price 0 per cent in September, 1989. On eve of the elections, the then Con- s (I) government decided to refloat ender. The official retendering was notified in February. In May, 1990 only one bid was received, from HHI. The Japanese who also take a keen interest in oil projects stayed away following the Indian government's decision to black-list them due to the alleged kickbacks given by a Japanese firm to an Indian businessman in some other deal.

Official sources find it surprising that the Koreans have quoted just about $30 million more than they had quoted about three years back and $5 million more than the last year. The bid is extremely attractive and there is little doubt that the ONGC will let the opportunity slip, unless of course the Neelam oilfield story is repeated. In the case of the Neelam project, the HHI was again the only eligible bidder and their offer was valid till September 28.

The ONGC steering committee, however, met only on September 26, just two days before the expiry of the validity date. The very next day ONGC did call the HHI officials for negotiations. However, HHI waited for two days and informed ONGC on October 1 that the prices have been increased by 15 per cent. In the case of Panna, the HHI offer is valid only till December 18. A final decision has to be taken before this date, otherwise the Koreans will definitely increase the prices. Panna is one of the three major oilfield development projects proposed to be executed in the Eighth Plan. The other two being the Mukta and Neelam oilfields. In these two oil fields as well, HHI has put in a bid. However, in Mukta, HHI is pitched against the Indian company, MDL and another Korean company, Dae Woo.

Panna oilfield has a peak production capability of two million tonnes per annum and three million cubic meters of gas per day. The corresponding figures for Mukta are 2.7 million and two million, respectively. The Neelam platfrom is designed to handle about six million tonnes of oil per year and 2.5 million cubic metres of gas per day.

EDC CREDIT TO *OIL*

Oil India Limited (OIL) and the Export Development Corporation (EDC) of the government of Canada have signed an agreement for an EDC line of credit of OIL amounting to US nine million dollars. This is pursuant to a three year old financial protocol between the government of India and the Canadian International Development Agency (CIDA). It will be coupled with a corresponding grant as US $5.52 million from the CIDA to the Government of India, a press release said at New Delhi.

OIL EXPLORATION

Call to involve foreign companies

Mr. Avijit Mazumdar, president of the Associated Chambers of Commerce & Industry of India (ASSOCHAM), has urged the Union government to involve foreign companies in a big way with the exploration and production programme as a first step towards raising oil production.

Commenting sharply on the dismal performance of the public sector oil companies despite huge investments, Mr. Mazumdar said the entry of foreign expertise should be able to reduce our dependence on imports and thus help tackle the critical balance of payments (BoP) situation. "Much of today's BoP crisis has been due to the huge oil import bill aggravated by poor domestic prodcution", he observed.

Addressing newsmen at Calcutta at the end of two-day meetings of various ASSOCHAM committees, the president felt that particular attention should be paid to step up onshore activities which were much less costly to undertake vis-a-vis offshore, Although the oil crisis continued to hit the economy, very large areas of sedimentary basins, where prospects of hydrocarbon could be bright had not yet been tapped. Referring to government permission already accorded to a few oil companies for undertaking exploration activities in certain blocks, he said only those blocks which were difficult to operate and where the hydrocarbon prospect was little had been identified by the nationalised oil producing companies for foreign participation. He emphasised the need for a total change in the government policy of oil exploration.

Mr. Mazumdar also expressed displeasure, against the induction of owner's relatives and associates with little managerial experience on the board of companies where some business houses held the majority stake. "As a professional manager, I am against such induction", he said and pointed out that precisely for the same reason he was opposed to induction of trade unionists on the board of the company. In a professionally managed company, an executive would have the entry into the board only after he had put in several years of service and thus acquired experience in handling management issues. When his attention was drawn to cases where even a professional manager would not have qualms to head the board of company full of such 'unprofessionals', he replied that the concerned professional was a mere employee in such a con ASSOCHAM president favoured the idea of taking the International Monetary means to tide over the crisis, conceded that the conditional not be palatable.

"This is not to suggest should be any compromise country's sovereignty", he added that the difficulties for period should help promote a big way. BoP, apart from major problems facing the according to him, related to hu deficit, inflationary situation change in government. The budget deficit, in his opinion due to the indecision on the policymakers and the absen real effort to curtail governme diture. "The steps announced the name of economy are on tic touches", he observed. stressed the need for doing a ad hocism in government p favour of an integrated long-te though he was not sure if the changes of governments at t would really help work out s policies. "Perhaps we have pared for an Italy-like situati frequent changes in the gover not affect the process of ind tion", he said.

S firm to formulate ONGC's global tenders

petroleum ministry has engaged rvices of the US-based consul- firm, Arthur D Little, to formu- nd evaluate the fourth round of l bids for oil exploration, expected floated shortly. The ministry will have to seek Cabinet approval e it floats the bids based on the US s report. The deal with the foreign pany assumes significance in view e lukewarm response from foreign panies to the third round in 1986, n internationally reputed company pected to prepare a package which ld be more acceptable to foreign ers. Sources say the Oil and Nat- Gas Commission has already pre- d the dockets containing details of he blocks proposed to be offered in fourth round. As many as 71 blocks be offered, of which 33 will be hore and 38 in offshore areas. In the d round of bidding in 1986, only 27 shore blocks were offered to foreign companies.

A better response to the fourth round also anticipated since the Gulf crisis s rekindled interest in oil exploration over the world. Economic viability exploration has also improved as a sult of higher international oil prices. dications are that most of the terms and conditions for the third round may be retained. These included a provision that the foreign oil companies share of oil discovered would be available to the govt. at international prices till India achieved self-sufficiency. Exploration was to be done at the foreign company's risk and cost, but if there was a commerical discovery, domestic oil companies could participate to the extent of 40 per cent in development and production. Besides, the domestic companies would be entitled to share output corresponding to their participation.

Other terms in the third bid included sharing of crude with the govt. on a sliding scale basis after the contracter recovered costs. The Indian govt.'s share would also increase as the project economics improved. The decision to offer more blocks has been taken in view of the need to accelerate oil exploration. Domestic production was not sufficient to meet rising demand, while imports were proving far too costly. Besides, production of other energy forms has not reached the desired levels.

PIPED GAS FOR SURAT FROM MID-'91

The Gujarat Gas Company is all set to supply piped natural gas to Surat from the middle of next year with the underground pipeline laying work scheduled to be commissioned shortly. Final touches have been given to the pipeline laying work from Adajan area, where the company's gas pumping station will be located, to Bhestan, Rander Road, Nanpura, Athwa Lines and Majura Gate areas in the first phase.

The work is likely to be completed before the next monsoon. Two km of underground pipeline will be laid daily. All the technical personnel have been recruited and the requisite raw material acquired. The gas pumping station will start receiving its daily quota of natural gas from the Oil and Natural Gas Commission's Hazira plant by April 1991.

These details were provided by Mr. K.P. Sinha, project co-ordinator of the company at a meeting between the company officials and members of the regional infrastructure and coordination committee of the Southern Gujarat Chamber of Commerce and Industry held at Surat in the last week of Nov.

Mr. F.B. Virani, the managing director of the company, said the pipeline laying work has been so designed that it accommodates a further seven lakh cubic metres of natural gas.

KANDLA-BHATINDA PIPELINE

EIL offers to execute project

Engineers India Ltd. (EIL) has offered to execute the Kandla-Bhatinda pipeline project on a turn-key basis. The offer has been made to Indian Oil Corporation (IOC) and is being considered by its board. EIL, which has also prepared the detailed project report (DPR) for IOC, has said that it has the necessary expertise to execute the project. The DPR was submitted to IOC about a month back.

If approved by the IOC board, it will be the first major project for EIL, which is famous for giving consultancy services. EIL is already thinking of setting up of a separate company which will execute major turn-key projects. The proposed company is likely to have a large capital base. The EIL board has approved in principle the idea of having a separate company for this specific purpose, sour ces point out. The government had approved IOC's proposal to set up the 1300-km pipeline in August. The clearance had come after a prolonged debate on the project. The ministries clashing over the project were the petroleum and petrochemicals ministry, railways and defence.

While the petroleum ministry wanted to set up the project, the railways and the defence ministries did not want the government to allow the project as it would erode the vaibility of the rail-line planned on the Kandla-Bhatinda sector. The net result was that the project got delayed though the battle ended in the petroleum ministry's favour. The delay resulted in cost escalation. According to a fresh DPR, the project will now cost more than Rs. 1,100 crores with the foreign exchange component exceeding Rs. 300 crores. The estimated cost in August was less than Rs. 1,000 crores, which included a foreign exchan component of about Rs. 200 crores. T project, when it was conceived abo three years ago, was estimated to c only Rs. 600 crores. The project is es mated to be completed in four yea IOC has not taken a final decision awarding the contract. It is learnt th participation of foreign companies executing the project is also being co sidered. EIL has also conveyed that ce tain areas which were not possible it to execute could be awarded to fo eign companies. EIL also does not ha any objections in joining hands with foreign company to execute the projec

The pipeline will traverse Gujara Rajasthan, Haryana and Punjab with 123-km branch pipeline from Kota Jodhpur. It will enable uninterrupte supply of petroleum products to th north-west and Koyali-Kanda-Okh region comprising Jammu and Kash mir, Punjab, Harynana, Himachal Pra desh, Delhi, Western U.P., Rajastha Madhya Pradesh and Gujarat.

BRITISH PETROLUM AGREES TO SUPPLY CRUDE

British Petroleum (BP), one of th international oil giants, has agreed i principle to supply crude to India o deferred payment. According to inter national oil industry circles, the to management of BP has given the gree signal and the details of the propose agreement are being worked out. Indi cations are that BP will provide credi for six months on a supply of one mil lion tonne of crude per annum.

Malaysia too has agreed in principl to a similar arrangement but a confir mation in this regard from that country is still awaited. The decision of BP and Malaysia will provide some relief to th foreign exchange-starved Indian gov ernment for sometime. The Indian gov ernment has been desparately seekin credits to finance oil imports in its anx iety to postpone borrowing from th IMF.

ONGC's zero-gas flaring project cleared

Buckling under the World Bank pressure, the Public Investment Board (PIB) at a meeting on December 6, gave a green signal to Oil and Natural Gas Commission's (ONGC) zero gas flaring project, estimated to cost Rs. 3,500 crores.

With PIB giving nod to the project hanging fire for almost a year now, one of the two stumbling blocks in the way of ONGC to get World Bank assistance to meet the foreign exchange requirements totalling US $1,350 million has been removed.

Because of the tight financial position, the Union Government has posed the projects to the World Bank. In response, a 12-member team had visited India in October this year.

The Bank is believed to have told the Government to first clear the project at its end and also lift ban on the participation of two Japanese companies in global tenders to be floated for the project.

The Japanese companies were blacklisted by the National Front Government for allegedly paying kick backs to some Indian businessmen in another ONGC contract.

The scheme envisages the development of L-II and III reservoirs at Bombay high. It was presented before a high-powered committee headed by the Expenditure secretary in August this year, but was not favourably considered.

It was pointed out that the South Bassein gas field and the creation of processing facilities at Hazira at a cost of about Rs. 1,500 crores were not giving adequate returns. At present just 50 per cent of the capacity of South Bassein is being utilised. In view of the resource crunch, the project was not considered feasible. Later on, the scheme attrac the attention of the World Bank wh had recently decided to lay grea emphasis on funding the gas develo ment programme.

The proposal submitted to the Wo Bank for consideration includes the f lowing components: (a) Expansion facilities at Hazira terminal, Bassein-Hazira pipeline, (c) SHG pr cess platform (Bombay high-south) a other associated jobs (d) NOP proce platform (Bombay high-north) alo with associated jobs and (e) Pipeli from ICP platform in Bombay hig south to Heera field.

The L-II reservoir is mainly prese in the northern part of the Bombay hig structure. The development of L-II env sages the construction of five well pla forms, drilling and completion of 4 wells, process platform 'NOP' inte connecting submarine pipeline and ga feeder line.

The reservoir simulation studies fo this reservoir have estimated an add tional production of 16.545 millio tonnes of oil and about eight billio cubic metres of gas. In addition to thi the implementation of this project woul help increase the utilisation of 2.69 bi lion cubic metres of gas over the entir life of the project.

The additional development of L-II which is also called the enhanced oi recovery project for Bombay high sout envisages the development of L-II resevoir by drilling additional infil wells to improve recovery.

The reservoir simulation studies hav indicated that it is possible to obtain a additional production of 40,004 MMT of oil and 18 billion cubic metres of ga by in-fill drilling. The processing and other related facilites planned would also enable increasing to utilisation of gas to the extent of 36 billion cubic metres for the entire life of the pro ject.

H PRESSURE IN ONGC WELL

ngineers failed to respond to warning signals'

e damage that was inflicted on an oratory oil well in the western off- region recently following the ion of abnormally high pressures, d have been averted if engineers esponded effectively to the warn- signals they received, it is learnt.

nquiries reveal that long before the ing operations reached the high sure zone, engineers of the Oil & ural Gas Commission (ONGC) had ountered a ''loss zone'', where the ing mud used to maintain the well sure (and prevent the pressure from ging upwards) began seeping into vices on the well's sides because of se rock formations. ONGC engine- managed to contain the mud loss by nping in loss circulation material and intained the pressure, but failed to nent the affected area. Cementing uld have ensured that the mud loss the affected area did not recur.

Upto a depth of 2,400 metres, casing es prevent the mud chemicals from ning in contact with any loss zones ng the way. The ''loss zone'', how- r, was encountered at a further depth 3,200 metres. Having temporarily ntained the mud loss in the area, the engineers continued drilling.

Some of the enginners present on the ''Sagar Bhushan'' drill ship positioned on the well, say that the primary error was the decision to continue drilling without cementing the loss zone. When the drilling operations reached the depth of 3,507 metres, the abnormally high pressures that were exerted upwards moved with such force that the temporary plugging of the loss zone gave way.

The gases and fluids within the well, pushed upwards by the pressure, reached the top of the well. At this stage, the engineers on board the drillship decided to divert the surging as through pipes alongside the rig structure, right to the top, and release it from there. This plan, however, did not work, thanks to the pressure of the gas, combined with an equipment failure.

The ''rams'' or clamps, holding the well's blow-out preventer that is positioned on top of the well, failed to work, causing the pipe to burst, and letting the gas and fluids reach the surface. Immediately, a fire broke out on the surface as the gas came in contact with oxygen in the atmosphere, but was quickly contained. This was done by shearing off the drill pipe with built-in equipment and simultaneously capping the well.

ONGC officials, however, maintain that there was no fire. Terming the encounters with high pressures and mud losses as routine occurences, they insisted that the loss zone was effectively contained at 3,200 metres by injecting mud chemicals of a higher density, before further drilling was undertaken. The report prepared for ONGC's senior management on the mishap does not mention the occurence of fire.

Industry insiders say that before drilling reaches the stage of encountering uncontrollable pressures, there are several built-in warning signals that allow engineers to respond effectively.

These pressures, referred to in oil industry parlance as a ''well kick'' takes place when the pressure exerted by the mud chemicals is lower than that of the gas and fluids within the well, which could occur when there is insufficient mud being injected. A manual on well control practices prepared by the US-based oil giant Exxon notes that insufficient mud in a well has been the primary cause of 50 to 70 per cent of all the blow-outs that have taken place all over the world so far.

While there are about 10 standard warning indicators that are monitored on a continual basis as drilling is in progress, in this case, the ONGC had one vital bit of information even prior to the commencement of drilling. The geotechnical order (analysis of well-related geological data) that was available before the well was spudded, clearly indicated the presence of a high pressure zone in the region. While this does not necessarily rule out prospects for drilling, it did forewarn ONGC's engineers about the possibility of a well kick.

Currently, the well is still active, but the possibility of a blow-out is ruled out. The drill ship Sagar Bhushan has been shifted to a safer location, but cannot be redeployed elsewhere as its blow-out preventer is still in the affected B-60-1 well. Two experts from the US-based oil-field disaster management firm, Boots & Coots, visited the site, but are yet to recommend a course of action. A decision to kill the well, however, has already been taken.

The job on hand now is to release the pent-up pressure of gas and fluids inside the well, which is to be done with the drilling of a relief well diagonally to connect with the affected well subsea. Even as a decision on how and when to do this is yet to be taken, the ONGC management is planning to contact several other disaster management firms to help out. ONGC sources said that the drilling of a relief well would take anywhere between 15 days to a month after work begins.

Oil mishap in western region: Another well may be hit

The recent mishap at an oil well in the B-50-1 field of the western offshore belt that narrowly missed a blow-out, is likely to adversely affect production at another oil field in the region. This is because salvage operations in the B-50-1 field following the mishap can be carried out only by redep equipment that are scheduled fo elsewhere. The salvage operatio most likely involve the drillin "relief well" in the B-50-1 field nect the affected well diagonal release the pent up high pressu has formed within.

The vessel shortlisted for this tion by the Oil and Natural Gas mission (ONGC) is the Viking dr which has recently been requisi from Singapore to carry out over" or clean-up operations at a well, named D-18-3, in the B High area. ONGC officials, ho said that a final decision on dep the Viking drillship is yet to be

If Viking is deployed for drill relief well in the B-50-1 field o next few days, it will delay the over" operations in the D-18-3 This, in turn, will also delay the re tion of production operations at 18-3 well by a semi-submersibl ing production system, Tahara, th been specifically contracted for t

The D-18 field, which is a ma field with estimated reserves of 2 lion tonnes of oil and oil-equiva gas, has about three production A reduction in pressure over th few months at one of the wells, 3, had led to a drop in productio lowing which the ONGC deci carry out "work over" operation basically involves servicing, a cleaning up of impediments su sand, to boost production levels

Production at the D-18-3 well ried out by an early production s which is a floating semi-subm equipment with its own proc storage and transportation fac Such systems are deployed in fields where it is not feasible to lisn elaborate processing platfor well structures that are not only sive, but also take three to four ye commissioning after work starts

gonising plight of Bhopal gas victims

e agony of the Bhopal gas tragedy claimed over 3,500 lives is still, six years of seemingly unending wrangles, on over five lakh ed faces that survived the tragedy. ns among the affected population hopal city are still high and those ted by the disastrous methyl iso- ate (MIC) gas, which leaked on the t of December 2-3, 1984, from the n Carbide Corporation's (UCC) cide plant in Bhopal, have no ce but to wait for an elusive settle- t out of court or otherwise.

1985, Parliament passed a law — Bhopal Gas Leak Disaster (Proces- of Claim) Act — empowering it to esent all Bhopal gas victims. The on Government sued UCC on alf of the victims in the US District rt, New York City, presided over by ge John F. Keenan. In May, Judge nan ruled that the US was an inap- priate forum for Bhopal trial and sent case to India. Though India appealed inst it, the Federal Appeals Court eld the dismissal of US cases in Jan- y 1987 and transferred the case to ia.

The court ruling on oleum gas leak m Shriram Food and Fertiliser at w Delhi in December 1985 and the preme Court judgement in December 86 dramatically changed the legal tus of the Bhopal case. According to Supreme Court judgement, the ount of compensation to be paid by defaulting company would be pendent not only on the extent of the nage caused but also on the assets d property of the company.

Further, the company would be whol- responsible for the disaster whatever case may be, the court said. The sur- vors of the world's worst industrial saster had a glimmer of hope on ecember 17, 1987 when the Bhopal ourt Judge, Mr. M.N. Deo, ordered CC to deposit in his court Rs. 350

compensation and welfare measures to the 5.5 lakh gas victims.

This order was challenged by UCC in the Madhya Pradesh High Court which on April 1988 reduced the amount to Rs. 250 crores. On another application of UCC, the Madhya Pradesh High Court ordered on October 11, 1988 the transfer of the case from Mr. Deo's court to another senior judge of the Bhopal Court against which the Union Government appealed to the Supreme Court.

On February 14, 1989, a five-judge constitution bench presided over by the Chief Justice Mr. R.S. Pathak, ordered UCC to pay Rs. 715 crores in full and final settlement of all claims, rights and liabilities arising out of the Bhopal gas tragedy. In March 1989 several organisations and concerned citizens filed petitions challenging the Supreme Court settlement. In May, the court passed an order which explained the February settlement, but also said that if the basic assumptions underlying the settlement are "wholly unrelated to realities" it would withdraw orders.

In December the Supreme Court upheld the constitutional validity of the Bhopal Act of 1985. However, the court order stressed the Government's obligation under the Act to consult the victims and to provide interim relief to them. It also ruled out quashing of criminal liability against Carbide.

With the formation of the National Front government at the Centre, the Rs. 715-crore settlement reached at the time of the Congress (I) government with UCC was opposed in July in the Supreme Court. After a marathon two-month hearing, the constitution bench headed by the Chief Justice, Mr. Sabyasachi Mukherji, reserved judgement in the case. But the death of Justice Mukherji necessiated a fresh hearing.

The re-hearing of the case challenging the constitutional validity of the Bhopal settlement commenced on November 11 this year.

Presently, the matter is heard by a five-member constitution bench presided by the Chief Justice, Mr. Ranganath Misra. Under these circumstances, even if a settlement is reached through the courts, the compensation received by the victims in actual terms would be much less taking into consideration the physical and financial deterioration of the gas-affected during the case's pendency, voluntary bodies fighting the case say.

Several medical studies conducted on the gas victims have pointed towards "systemic and persistent toxicity" in the bodies which poses long-term damages to present and future generations.

Medical reports also ruled out the Union Carbide theory that "MIC" causes only local damages to eyes and lungs and thereafter gets destroyed on contact with water on these body surfaces.

Meanwhile, the latest annual report of the Indian Council of Medical Research's Bhopal Gas Disaster Research Centre (BGDRC) provides evidence of continued harmful effects of violent chemical reactions and leakage of toxic gases, according to an expert committee headed by Dr. S. Vardarajan, Secretary, Department of Scientific and Industrial Research.

The report was placed in Parliament on December 20, 1985, and the Government accepted the report in toto. The report also described theories of sabotage often repeated by UCC as mere "after thought".

Six years after the tragedy some key issues concerning relief and rehabilitation of the gas victims remain to be addressed, says the Bhopal Gas Peedit Mahila Udyog Sangathan, Bhopal Gas Peedit Sangharsh Sahayog Samiti and the Bhopal Group for Information Action.

The Bhopal Gas Peedit Mahila Udhyog Sangathan has claimed that around 20,000 lives were lost in Bhopal since the gas tragedy in December 1984.

Its conventor, Mr. Abdul Jabbar Khan, said the figure includes over 10,000 persons whose names were registered in the Collectorate as having died of the after-effects of the gas leakage.

The figure also comprised infants who could not live for long as their mothers were suffering from the after-effects, he said.

He alleged that the Madhya Pradesh Government has not taken any steps to rectify the mistakes committed in the medical categorisation of the Bhopal gas victims.

The Sangathan claimed that almost six years after the disaster, the financial, social and physical problems of the Bhopal gas victims have not decreased.

They also charged that about one lakh children living in the 36 gas-affected wards of Bhopal have been deprived of compensation as they were wrongly informed that those below 18 years of age could not file their claims.

They said that during the last two years, there was "absolutely no progress" on schemes for financial rehabilitation of gas victims and setting up of a special industrial area to provide them jobs.

A lot of irregularity are being committed in the distribution of interim relief to victims.

The Supreme Court on March 13, last approved with certain modifications the recently announced interim relief by the Centre at the rate of Rs. 200 per m per individual to about five lakh vic The victims of the tragedy contin suffer from neglect at the hands o government and society. In the la years, over 1,300 people have without getting a rupee as relief.

DAE ACTION PLAN TO CH MISHAPS

The Department of Atomic En (DAE) has initiated an accident- pre tion programme in all its major ating facilities in the country. programme is designed to ensure each employee can carry out assignments without risks to his h or to that of his collegues, accordi official sources.

To achieve this objective, rou surveys are being conducted to as the hazards from air pollutants in ferent industrial operations.

Ventilation surveys are being ducted to verify if the exhaust prov in the work areas is effective. Phy agents like noise, illumination microwave radiation are evaluated

According to the sources at Bhabha Atomic Energy Rese Centre (BARC) Bombay, a coun wide natural radiation survey u thermoluminescence dosimeters h been carried out.

The survey has yielded radia zones of widely varying levels, wh correlate closely with the known g logical formations, the BARC sou said.

The Deccan plateau, consis mostly of basalts of very low prim dial radioactivity had shown the lo radiation level, which included cos components also. The monazite reg of the western and eastern coasts granite rocks of northern and no eastern India had shown the hig radiation levels, the sources revea

IPCL — disaster and implications

e disaster that struck the Maha-a Gas Cracker Complex (MGCC) e Indian Petrochemicals Corpora- IPCL) at Nagothane recently, has ed 31 lives so far, and badly upset xpansion programme of the public r firm. The grassroots petrochem- complex, set up at an investment out Rs. 1,400 crores, was all set to n commercial supply of important ochemicals, like low density poly- lene (LDPE), since production had begun. The loss of production ns further importance since domes- upply of these materials would have d precious foreign exchange in a tion of acute external payments dif- lties.

nmediately after the tragic gas leak explosion, the government ounced a high level technical com- tee to enquire into the cause of the ident, and to recommend further ety measures that could avert such haps in future. The committee will headed by Dr. R.A. Mashelkar, the ector of the National Chemical oratory, Pune. Mr. V.H. Chauda- ni, Director (Technical) of Hindustan ganic Chemicals would be the mber-secretary of the committee.

While IPCL officials have main- ned that the exact cause of the accid- ent would be identified by the high-powered committee, it is clear that the company did not have in place, the kind of disaster management plan that is required under the amended Factories Act. In retrospect, it is apparent that the death toll perhaps would have been lower if the workers, as well as the staff of other factories, who rushed to the accident site and were roasted alive, had been trained to deal with disaster contingencies.

The Factories Act clearly states under section 41(b)(4), that every occupier shall with the approval of the Chief Inspector of Factories, draw up on-site emergency plans and detailed disaster control measures for their factory, and make it known to the workers employed therein and to the general public living in the vicinity of the factory. As is to be expected; the accident has angered the local population, who were even otherwise alienated by the failure of the MGCC to generate any additional employment for them.

A section of the residents have made demands to even close the complex so that such accidents would be avoided. And in a bid to clear the air of wild rumours, the IPCL management has denied that it is using any toxic gas in the premises, which could lead to heavy deaths. As the official committee of enquiry begins its work, it is being conjectured, that the offsite battery limit (OSBL) plant or the feedstock receiver through which ethane and propane are channeled from the Uran plant of the Oil and Natural Gas Commission (ONGC), might have developed a leak due to metal fatigue. Once the leak occurs, the hydrocarbon mixture (gases) float just above the ground level, since they are heavier than the air. A minor spark is enough to cause the fire, which could in seconds, engulf the entire area.

IPCL has estimated the loss due to the accident at Rs. 30 crores, as the mother plant, i.e., the gas cracker unit, has not been affected by the fire. However, since production has started and the company was in the process of receiving orders from users, the sales loss may be significant. The company has maintained that it will take four to six months to restart the plant. It is estimated that the plant was working at less than 50 per cent capacity, and might have attained 60 per cent capacity utilisation by the end of the year.

Apart from the general impact on the petrochemicals industry, which is not yet fully known, the expansion plans of IPCL have themselves received a big setback. It is certain that the gas cracker complex that the company was planning

to set up at Gandhar, will be delayed due to lack of funds. IPCL was hoping to raise funds for the new project out of the sales proceeds of MGCC.

The resource crunch that IPCL's expansion plans are likely to face, especially in the context of this accident, has yet again raised the issue of privatisation of public sector companies. According to Mr. Vijay Merchant, chairman of the All India Plastic Manufacturers Association, the lack of funds due to the MGCC disaster, should not hold up the Gandhar complex of IPCL. The company should either raise funds through bonds, or offer 51 per cent equity to the investing public to raise resources to offset the current loss.

IPCL has been a pioneer in the petrochemicals industry since its incorporation in 1969 as a public sector undertaking. The company produces a vast range of petrochemicals, and is widely regarded as one of the best-run companies in the public sector. With the discovery of Bombay High crude oil in the 1970s, the need was felt to set up a new petrochemicals complex based on gas obtained as a by-product of oil extraction.

Studies indicated the possibility of setting up a 3,00,000 to 4,00,000 tonnes ethylene plant based on ethane and propane feedstock extracted from the associated gas in Uran. The Govt. of India chose Nagothane in Raigad District of Maharashtra as the site for setting up the petrochemicals complex. Given its record and experience of running a large integrated petrochemicals complex at Baroda, IPCL was entrusted the task of erecting and operating the MGCC.

When fully operational, the gas cracker complex will produce 4,00,000 tonnes of ethylene, 30,000 tonnes of propylene from the gas cracker, and 36,000 tonnes from the propane-propylene stream. The major products from the complex would be the the plastic resins, covering the entire r from low density polyethylene (LD linear low density polyethy (LLDPE), and high density polye lene (HDPE) to polypropylene ethylene oxide (EO) and ethylene g (EG). The various grades of polye lene are used in the conventional tic applications, whereas ethylene g is used as an intermediate in polye while the different uses of polypr lene constitute an expanding list.

IPCL officials maintain that have not made any compromises either safety or quality while erec the plant. According to them, the p has incorporated the latest techno available in the world, and technical laborators have been enjoined under terms of the agreement, to pass on improvement or modification to Indian plant. The technology has b provided by the well-known Stone Webster Engineering Corporation of US.

The accident has once again brou to the fore the environmental hazard big petrochemicals complexes. R now, it is to be seen whether the mu awaited expansion of the Mafa Group's National Organic Chemic Ltd. (NOCIL), will go ahead smooth or face some renewed safety hurdles the wake of the MGCC accident.

The need to evacuate work promptly from the accident site, pro rehabilitation programmes for people displaced by the projects, an greening programme for the ar around the complex, have been iden fied as critical items on the safety che list. It may be recalled that when MGCC complex was conceived, the was a plan to develop a surroundi green belt of around 370 acres. The p rochemicals industry, which is j around three decades old, has ambitio expansion plans over the next few yea Inclusive of the MGCC complex, government has sanctioned 11 pet

l complexes to be set up in the , Eighth and Ninth Plans. The cker at Hazira, the naphtha at Vishakapatnam, the gas at Auraiya in Uttar Pradesh, the cker at Gandhar, NOCIL's on plan at Thane, Maharashtra, er cent export-oriented naphtha in Tamil Nadu, the Haldia pet-icals complex, the aromatics x at Saleempur — these are the projects awaiting execution coming years.

x has already commenced in the projects, like Haldia in West Besides, the govt. has also d the recommendation of the wered J.J. Mehta Committee re- the minimum economic scale of which would mean that complex-d be gigantic and would involve vestments. The need to take the opulation into confidence, and to e them in the growth process can be over-emphasised, after the C experience.

per prepared by the FICCI "The hemicals Industry in 2000 AD", hat the level of investment need-oridge the gap between the de-and supply of petrochemicals by of the century would be between ,000 and Rs. 26,000 crores. This close to the estimate prepared by V. Kapur Committee on Perspec-lanning for the Petrochemicals ry, which submitted its report to vernment in 1986. Since the inter-al prices of petro-products have rising continuously, and have ed further momentum in the wake Gulf crisis, the urgency of speed-implementation of these projects es manifest.

FICCI paper has urged the pro-of feedstock, fuel oil, and energy e petrochemicals sector at inter-ally competitive prices, the estab-nt of parity between domestic of capital and world prices, the on of new markets especially for s, and the modernisation of tech-nology. Now, in the wake of the IPCL experience, the institution of adequate safety measures and contingency plans, for both the workers as well as the people residing within a certain radius of the plant, should also be given the priority they deserve. These, as much as any of the other factors, also seem vital for the healthy growth of the petrochemicals sector in the country.

CPCB READY TO PAY 50% OF SSI WASTE TREATMENT PLANT COSTS

The Central Pollution Control Board (CPCB) is willing to bar 50% of the cost of setting up effluent treatment plants (ETPs) in small scale units where waste water can be recycled. The CPCB chairman, Mr. N.S. Tiwana, said in Calcutta recently that the board had identified several SSI units where the consumption of water can be reduced and its quality can be improved. The CPCB is now in the process of identifying units in other sectors where ETPs would be useful. However, the problem of supplying safe water in cities is worrying the authorities because sewerage systems in densely populated areas had been neglected in spite of increasing urbanisation. The board anticipates a drastic shortage of water in cities by the year 2001 when the demand for potable water is expected to shoot up to a billion cubic metres. Water supply schemes are costly and the search for cheaper and safer pipelines should be intensified.

TREATY TO FIGHT OIL POLLUTION

A new international treaty designed to help governments combat major oil pollution incidents has been signed in London at the end of a two-week conference attended by delegates from 90 countries. The treaty — the international convention on oil pollution preparedness, response and co-operation, 1990 — was developed following a meeting of leaders of the major industrial nations in Paris last year.

Fertiliser producers seek retail price hike

The Fertiliser Association of India (FAI) has suggested that the government should gradually increase the retail price of fertilisers to reduce the ever-rising fertiliser subsidy.

The FAI chairman, Mr. H.S. Bawa, told newsmen at New Delhi on December 5, that a 10 per cent increase in retail prices can reduce the subsidy by Rs. 500 crore. He pointed out that while the retail price has been unchanged since 1981, the prices of inputs required for fertiliser production have been raised frequently, increasing the subsidy burden on the national exchequer.

Mr. Bawa clarified that FAI was not in favour of any sharp increase in retail prices but only wanted gradual increases to keep the subsidy bill under check. Pointing out that the subsidy is actually benefitting the entire food economy, he said only a very small fraction of the subsidy accrued to the industry in the form of statutorily permitted profits. Unfortunately, the industry's viewpoint on this issue is not appreciated by the government, he added.

Frequent changes in retention price scheme (RPS) effected by the government to make small savings in subsidy has created uncertainty in the minds of entrepreneurs. They are not coming forward in large numbers to set up new projects.

The capacity addition in the industry has, in fact, slowed down considerably during the recent years. Moreover the shortfall in indigenous supplies cannot be met fully through imports because of foreign exchange crisis and sharp rise in nutrient prices in the international market. Mr. Bawa cautioned about a possible fertiliser shortage during the current rabi and serious problem in kharif 1991. According to a FAI background paper the government rec decided to sanction only one-four the total foreign exchange require for phosphatic fertiliser imports d the remaining period of 1990-91, will either affect or restrict substan the phosphatic fertiliser consump during the current rabi and leave little stocks for the beginning of kharif. The problem has been pounded by the government's deci to allocate a small fraction of the foreign exchange requirement import of phosphoric acid required the production of diammonium p phate (DAO).

The delay in acid imports has alr led to the closure of six DAP plants a cutback in production at two o plants. DAP units were also plag with acid shortages in the previous and the overall capacity utilisatio phosphate industry is expected t about 67 per cent, the same as 1989-90.

Mr. Bawa reiterated the indust demand for payment of stand charges to DAP plants during the pe of their closure because of availability of imported acid. He s gested the government should incentives to old but efficiently oper plants to enable them to expand incremental production can be achie with minimal investment.

Talking about the prospects of Chemical's rights-cum-public issue in view of the unattractive returns investment in fertiliser industry, hoped the issue will succeed. The in tors have a certain amount of confide in certain entrepreneurs.

When they see Tatas (Babrala p ject) and Birlas (Gadepan proj investing hundreds of crore of rupee gas-based fertiliser units, they feel entrepreneurs will make their proje a success and convince the governm for suitable changes in RPS, he sa

FAI plea for new fertiliser units

e country is going to face an acute ser shortage from next year with mption outstripping the stagnating uction and imports becoming ssible due to the foreign exchange ch.

ccording to the latest assessment of ertiliser situation by the Fertiliser ciation of India (FAI), the Gov- ent should take immediate steps to tion new manufacturing units and urage maximum production in the ing ones.

AI, an association of fertiliser manu- rers including, the public and co- ative sector ones organised its ual seminar on the "fertiliser scene he nineties" at New Delhi on ember 6. Several foreign specialists took part in it.

arlier, Mr. Pratap Narayan FAI cutive Director said, the looming rtage of fertilisers could jeopardise Government's plan to divert a higher centage of investible resources to the l sector in the Eighth Plan and crack national food security system. An te fertiliser shortage would end up farmers paying a black market price the middlemen taking advantage of h a situation, he added.

During the current year, fertiliser con- nption may rise to a record 12.3 mil- n tonnes while the indigenous oduction is expected to be only 8.6 llion tonnes. However, with the car- over stocks, things could be well naged for the year, the FAI study d.

However, from next year onwards, oduction will be stagnant as no new it is expected to be commissioned. In ct no new units are yet planned for plementation during the Plan period. r. Narayan said as the prospects of rge scale fertiliser imports had been led out by the Government, immed- te steps should be taken to remove the constraints imposed by the policy decision to ensure maximum production from the existing units.

He also wanted the Government to accord priority to allocating natural gas to fertiliser units. "Electricity can be produced even from coal, but gas is the ideal feedstock for fertilisers", he added. Mr. Narayan said the existing pricing policy decided by the Government for fertilisers was hampering new investments in the sector. He wanted the Government to review the unilateral decisions that affected the profitability of fertiliser plants, 72 per cent of which are in the public and co-operative sectors.

CHEMICALS USE, BEST WAY TO CONTROL RODENTS

Using chemicals is the cheapest, most effective and feasible method of reducing the rodent population in the country to tolerable levels, according to studies conducted by scientists at Rajasthan University. Laboratory tests and research work over the past ten years with various types of rodenticides and their evaluation in the field conditions had revealed that the best method to reduce the rodent population was through chemicals, followed by trapping and fumigation. Mrs. Y. Saxena, Associate Professor, zoology department of the university, who led the research team, said that several conventional control methods such as sanitation, manipulation by biological, mechanical, chemical and behavioural methods, habitat manipulation and environmental management had been used for the past 65 years. Of these, control through chemicals is the "most expedient and immediate" means of reducing rodent population, she added. Mrs. Saxena said that rodents constituted one of the single most important group of pests because of their lethal role in destruction of the food and life of humankind.

FACT sales rise sharply, profits up

As the foreign exchange starved nation struggles to supplement its fertiliser stocks through heavy imports, encouraging news comes of excellent capacity utilisation and production from the Fertiliser and Chemicals Travancore Ltd. (FACT).

While news of India's imminent entry into the world market has jacked up international fertiliser prices, FACT has registered a substantial rise in sales turnover and notched up handsome profits during the first six months of the current year. Moreover, for the first time during the last 17 years, FACT has also achieved full capacity utilisation at its ammonia plant in the Cochin division.

This implies that the annual ammonia import bill for FACT will have been drastically reduced with this unit alone requiring 1.5 lakh tonnes of imported ammonia for producing nitrogenous fertilisers every year. This could not have come at a better time because FACT's caprolactam plant — another guzzler of ammonia — has been commissioned. Meanwhile, net sales of FACT shot up from Rs. 129 crores during the first six months of last year to Rs. 234 crores during the same period this year. As a result, gross zoomed to Rs. 13 crores from a loss of Rs. 11 crores last year for the same period.

With the 25 per cent Gulf surcharge, it has been estimated that the fertiliser subsidy this year might jump to a whopping Rs. 4,000 crores. The divergence between consumption and production is also likely to be more marked leaving a gap of 1.78 million tonnes, which will have to be met through imports.

With the current power cuts imposed and the restrictions on the import of phosphoric acid, the production capacities of this southern fertiliser giant remained underutilised and sales plummeted from Rs. 438 crores in 1988-89 to Rs. 358 in 1989-90. If the current production trend is maintained in coming dry summer months, when possibilities of power cuts are great only then can the unit hope to overthe production achieved in 1988-

There is also the problem of reduction in the import of naphtha vital requirement for all fertiliser u It has been reported that the redu production of fertilisers in the cou has been the direct result of a cut in import of crude in the wake of the crisis. The ammonia unit in the Co division with a capacity of 600 ton per day achieved full capacity utilisa in August this year and produced arou 18,000 tonnes of ammonia.

This is also good news for, the ne commissioned caprolactam projec FACT would have pushed up impor quirements of ammonia to 2.3 lakh nes annually. With the soaring price ammonia in the international mar this would have entailed a heavy d on the precarious foreign excha kitty.

INDUSTRIAL EXHIBITION IN BOMBAY

Shri Bhagubhai Mafatlal Polytech will be organising an exhibition of in strial products, in collaboration with Alumni Association of the Polytech in the spacious campus of the P technic from Jan. 18th to 20th, 1 (Friday through Sunday). To be or nised with a specific view to (a) disp the products manufactured/fabricated the past students of this Polytechnic (b) encourage new entrepreneurs, exhibition will be conducted entirely a non-commerical basis. It is estima that the number of stalls would be in region of 100. The exhibition is lik to be inaugurated by a dignitary fr the industrial field.

Further enquiries can be had fr Shri A.N. Sanghvi, Dean, Adminis tion, Shri Bhagubhai Mafatlal Polyte nic, Irla Juhu Rd., Vile Parle (Bombay 56. Tel.: 6140022, 61422 6142252.

Company Notes

AMINES

art-finance the cost of expansion, Amines Chemicals will be shortly a rights issue of partly convert- bentures of the aggregate value 482.15 lakhs and non-convertible ures of the aggregate value of 1.80 lakhs, for which the CCI t is awaited. The company's ion programme of setting up a ant for manufacture of methyl- and ethylamines at the existing n is being implemented as per le.

anwhile, the company's net sales months ended September 1990 s. 550.92 lakhs compared to 75.44 lakhs from same period last an increase of 47 per cent. The profit for period amounted to 27.26 lakhs against Rs. 49.97 (Rs. 89.26 lakhs if insurance against losses due to flood is nted) for the corresponding period previous year. The net profit for riod amounted to Rs. 90.06 lakhs, ared to Rs. 19.62 lakhs (Rs. 52.91 if insurance claim is accounted).

PAK FERTILISERS

epak Fertilisers and Petrochemi- Corporation has produced good ts during the six-month period d September 1990. The gross profit aken a quantum jump to Rs. 19.17 s from Rs. 10.04 crores in a sim- period last year following a marked n turnover to Rs. 35.60 crores from 19.80 crores. The net profit has shot o Rs. 15.19 crores from Rs. 5.60 es after depreciation (Rs. 3.98 es against Rs. 3.35 crores) and tax- n (nil against Rs. 1.08 crores).

uring the period production of nonia was 23 per cent higher com- d to the same period as the plant rated at 109 per cent capacity against er cent. Sales of ammonia were up by 57 per cent during the period. Pending finalisation of retention price of ammonia, the results are prepared on the basis of the provisional retention price. The company's turnover includes Rs. 8.18 crores being dividend on units of UTI (Unit Trust of India).

Commercial production from some of the new plants is expected to commence before March 31, 1991 and considering large admissible tax depreciation on new plants, no tax liability for the current year is expected to arise. All the new projects under implementation entailing a total capital outlay of around Rs. 396 crores, are progressing well. Expenditure already committed exceeds Rs. 300 crores and these plants are expected to be commissioned during March-June 1991.

CLOSELY-HELD APAR TO MAKE PUBLIC ISSUE FOR NEW UNIT

The Rs. 148 crore Apar Ltd. a closely-held company will enter the capital market this month with its maiden equity issue for its new company —Gujarat Apar Polymers Ltd.

The Apar group now has three divisions — speciality oils, speciality rubber and latex and bulbs, tubes, speciality lamps and luminaires marketed under the brand 'Cema'. The speciality oils division, set up in technical collaboration with Sun Oil Co. of US, has an annual capacity of 65,000 kilolitres. Apart from being a leading processor of paraffin oil for the past 17 years, Apar also has a 50 per cent market share in transformer oils.

The speciality rubbers division produces a wide variety of high styrene self-reinforcing styrene butadiene rubber (SBR) and latex for use in ebonites, caster wheels, battery containers, shoe-soles and floorings. The company also has a Rs. 10.5 crore lamp complex in Gujarat and undertakes conversion of aluminium ingots into rods and manufactures solid state devices.

In 1989, Apar Ltd. registered a turnover of Rs. 78.21 crore and a gross profit of Rs. 6.45 crore and hopes to raise them to Rs. 147.74 crore and Rs. 11.7 crore, respectively during the current year. Speaking to reporters at Bombay on Nov. 5, Dr. N.D. Desai, chairman and managing director of Apar Ltd. said the country was importing rubber worth Rs. 600 crore every year which he felt, was totally unnecessary.

Dr. Desai, who is also an advisor on the DGTD panel on rubber, said domestic demand for synthetic rubber would grow rapidly. To meet this demand, the Apar group is launching Gujarat Apar Polymers Ltd. for manufacturing 6,250 tonnes of acrylonitrile butadiene rubber (NBR) and latex at a cost of Rs. 38.30 crore. The company has been co-promoted by Gujarat Industrial Corporation Ltd. in the associate sector.

Dr. Desai said about 6,500 tonnes of NBR were imported last year, mostly from Japan, South Korea, Canada, the US and Germany. At present, there is only one NBR manufacturer in the country with an installed capacity of 2,000 tonnes and its annual production is meagre.

Gujarat Apar has entered into a technical collaboration with Goodyear Tyre and Rubber Co. of the US. NBRs are widely used in rice dehusking rollers, moulded and extruded goods, oil hoses, gaskets and seals, beltings and oil resistant rubber components requiring cold flexibility for applications in aviation, automobiles and railway parts.

The Rs. 38.30 crore project will be financed by a rupee term loan of Rs. 22.35 crore, foreign currency loans of Rs. 1.49 crore, cash subsidy of Rs. 30 lakhs and an equity capital of Rs. 14.16 crore. The promoters are contributing 40%, or Rs. 6.07 crore, of the equity capital, GIIC Rs. 1.56 crore,

Rs. 75 lakh has been allotted to the Asian Development Bank and Rs. 1.04 crore to Unit Trust, ICICI, Indbank Mutual Fund and SBI Mutual Fund. The balance Rs. 4.74 crore will be offered to the public through a prospectus.

TATA CHEMICALS PROSPECTUS: CAUTION IS THE WATCHWORD

The prospectus of Tata Chemicals Ltd., (ITC) is a study in contrast. Its cover page cautions the prospective investors of what could well be in store for them.

Thus, there is a front-page 'caution' all in red ink, which tells those browsing through the 36-page document that they should specifically read certain clauses in the prospectus.

The 'caution' box reminds one of the 'danger' signals dangling before high-voltage transmission lines, with only the ubiquitous skull and bones missing. Alongside, but again on the cover, TCL states: The proceeds of this issue will be exclusively utilised to part-finance the implementation of the Tata Fertiliser project at Babrala — now a division of the company.

TCL however, explicity volunteers the assurance, with the consent of the Controller of Capital Issues that, in the unlikely event of the proceeds realised for this issue not being utilised for the purpose for which it is made, TCL will refund such proceeds to the subscribers together with interest calculated at 15 per cent per annum.

It is not clear whether CCI had made it mandatory for TCL to print the warnings. For that reason, however, the prospectus is unique.

And what do the clauses meant for compulsory reading suggest?

The caution box says.. before deciding to subscribe to this issue, you are requested specifically to read: 1 (II) page 3, item 17 (V) page 19, item 18 page 21 and also item 6 (4) page 6 and item 17 (XI) page 20.

TCL issue of capital of Rs. 400.375 crores is dedicated to the implementation of the fertiliser project. Out of this, the rights issue of 12.5 per cent partly convertible debentures of the face value of Rs. 196.875 crores of which Rs. 9,375 crores is reserved for employees, and 14 per cent non-convertible debentures of the face value of Rs. 123 crores.

The public issue is 12.5 per cent partly convertible debentures of the face value of Rs. 80.50 crores of which Rs. 38.50 crores is reserved for preferential offer to the shareholders and Rs. 4.025 crores for the employees.

The rights issue opened on November 1 and public issue will open on December 10.

According to caution item 17 (V) page 19 the feedstock, as envisaged in the project reports is natural gas, to be made available by the Gas Authority of India (GAIL) through the HBJ pipeline. With a view to protecting the allocation of gas supply to the company's fertiliser project.

The company was reluctantly compelled to file a writ petition before the High Court of Delhi seeking redressal.

The company has however, made it categorically clear that it will sign the contract for supply of gas on terms and conditions which are judicially held to be fair and reasonable.

Some important factors to which investors specific attention is drawn in the explanatory brochure says... the prospective investor should bear in mind that the prices of fertilisers are determined by the Government and sale of fertilisers is somewhat dependent on climatic conditions.

On the other hand, attention mu be drawn to the fact that fertilise a vital input for the production of required for our growing populatio it is reasonable to expect that the ernment policies will not hurt th tiliser industry.

In fact, a fertiliser project wh technologically and financially founded and is well managed can handsome rewards to the investo

The present status of the projec that at the time of reporting, the pany has achieved an overall pro of about 23 per cent towards the i mentation of the project — it has i red an actual expenditure Rs. crores and committed an expenditu Rs. 161 crores up to August 31, barring any unforeseen or unforse circumstances, the mechanical co tion will be achieved in 36 months the date of placement of effective o to foreign and Indian suppliers an complex will be commissioned w six months of the mechanical co tion.

TIDCO TO DISINVEST IN P TASIA CHEMICALS

The state-owned Tamil Nadu I strial Development Corporation (TIDCO) is disinvesting its 26 per stake in the joint sector Pentasia C icals Ltd., in favour of Asian Paints the private promoter.

The upset price of Rs. 25 fo Rs. 10 share of Pentasia (now qu around Rs. 34 in the Madras Ma has been accepted by Asian Paints the deal awaits clearance from the i tutions, CCI and MRTP.

Once it becomes a subsidiar Asian Paints, Pentasia is expected t an effective support from the p company for speedy revival. Penta accumulated losses as on March 3 year came to Rs. 5.25 crore.

this year itself, TIDCO planned out of the joint sector unit. But e government told the corpora- defer the proposal after noticing r performance of the company fluctuating share prices.

n Paints too was not keen on ing its stake and preferred to wait operations of Pentasia stabilised.

unit was promoted by TIDCO sian Paints at a cost of Rs. 22 with a capacity to produce 3,000 of pentaerythritol and 1,800 of sodium formate.

plant, located at the Sipcot com- t Cuddlaore in South Arcot dis- was commissioned in October

er since it went on stream the unit een struggling to reach full capa- Projections on demand-supply for erythritol have gone haywire. Against the current estimated demand of 7,500 to 8,000 tonnes, the capacity created comes to 13,000 tonnes.

Pentasia is forced to compete with six manufacturers in the field. The government has also delicensed the manufacture of the raw material.

During 1989-90, it achieved a capacity utilisation of 80 per cent producing 2,376 tonnes of pentaerythritol and 1,156 tonnes of sodium formate.

At one stage, the company faced the threat of complete erosion of its Rs. 7.35 crore equity by the accumulated losses and become a BIFR case. Luckily, Asian Paints intervened to extend a good price support for pentaerythritol, which improved the price realisation for the material.

Reflecting the improved performance of the company in the current year, Pentasia has reported a turnover of Rs. 6.15 crore during the six month period ending September 30, 1990 against Rs. 5.13 crore in the corresponding period last year.

It has earned on operating profit of Rs. 95.26 lakh (Rs. 6.04 lakh loss) and has managed to contain the net loss to Rs. 2.44 (Rs. 1.03 crore). During the 12 month period in1989-90, the company reported an operating profit of Rs. 94.08 lakh on a turnover of Rs. 10.31 crore. After providing for depreciation and interest charges, it suffered a loss of Rs. 1.01 crore.

In the light of a discouraging outlook for the paint industry, the company is not sure about sustaining a good show in the latter half of the current year. Added to this, it faces the problem of availability of acetaldehyde from distilleries, because of the cheap liquor policy. It is also yet to get an IFST of Rs. 20 lakh from the government. Besides, export prospects are not good.

Commerce, industry ministries may be merged

The ministries of commerce and industry are likely to be merged, going by the speculation doing the rounds in Udyog Bhavan. The possibility is that the two ministries may have a common secretary.

Another view is that the two ministers will have independent secretaries both of whom would, however, report to a principal secretary. In other words, the principal secretary would have overall charge of the two ministries.

Sources at New Delhi say that the proposed move is expected to help in bringing about proper co-ordination between the industrial and export import policies.

While it is too early to talk about the seriousness of the move, the fact is that the subject has become the talking point among the officials in Udyog Bhavan.

In the event, the move becomes a reality, the sources say, the ministry of textiles will cease to have an independent existence. In all likelihood, it will be merged with the commerce ministry.

In fact, for quite some time, it is being felt that it is meaningless to have a separate ministry for textiles. After all, its major functions are to deal with exports. The subjects relating to production (industrial, that is) could be dealt with the ministry of industry.

In other words, work relating to exports could go to commerce and production to industry ministry.

Another argument in this regard is that exports, per se, come under the commerce ministry and, therefore, there is no justification for the subject tiles) to be administered by a ministry.

More important, it is the com ministry which participates in th otiations relating to interna trade in textiles and allied issue whole. Therefore, the ne d for bri the textile ministry under comm

This apart, the speculation is th present commerce secretary, Mr Shukla, may be elevated as financ retary.

The argument in this regard is t Union finance minister, Mr. Yas Sinha, himself has sought Mr. Sh services. To add to it is the fact t minister, an ex-IAS man of 196 a good rapport with Mr. Shukla, three years senior to him in servic Shukla is also from the Bihar c

Sources at New Delhi say that ever the changes, the implemen will begin only after the complet the current round of Uruguay talk Mr. Shukla, is considered an aut on the issues relating to multi trade negotiations.

Mr. Shukla's presence in Br and his expertise, therefore, are c ered invaluable. The government not like to disturb any existing ar ment. In any case, all decisions w taken only after the return of the team to Brussels. The team is ret on December 9.

The concurrence or otherwise new commerce minister, Dr. Subr iam Swamy, would also have taken for bringing about any chan the commerce ministry. At the time, the fact that the industry m continues to be under the charge Prime Minister is being taken to that changes are definitely afoot character in the next few days.

— Economic T

'ORTS TO RUPEE PAYMENT NATIONS

per cent ceiling fixed on import content

he Commerce ministry has decided ix the ceiling at 30 per cent for ort intensity in goods being pro- ed for exports to rupee-payment ntries. In some genuine cases where exporters are constrained to exceed ceiling limit, the government will in an undertaking from them to re- the excess foreign exchange lost ore issuing any advance import lic- es to them.

Announcing this at an "open house" anised by the Federation of Indian port Organisations (FIEO) at mbay on December 7, Mr. A.K. kina, export commissioner, said that government has resorted to this rse for conserving the country's fra- foreign exchange reserves, because st exporters to rupee payment coun- es imported a lot of inputs from the neral currency area (GCA).

Mr. K.L. Rekhi, chairman of the Cen- l Board of Excise and Customs BEC), either clarified or promised to consider a wide range of ambiguous ovisions in the import-export policy which Mr. Ramu Deora, FIEO pres- ent, drew his pointed attention. Deal- g with specific issues of anomalies sed by individual export houses, he so announced his decisions with their r-reaching implications. Mr. Rekhi nounced that the CBEC has issued lf-a-dozen guidelines to customs col- ctors so that they would pedal softly d not hurt the genuine trade while plementing the Section 67 provisions ncerning bond-to-bond transfer of nported goods.

It was pointed out to him that the cent customs notifications No. 54/90 d 7/90 issued by the Bombay and andla customs houses, respectively, quired importers to submit bank guar- ntees for 100 per cent of customs duty ayable on imported consignments nder bond-to-bond transfer basis. And that resulted in blocking up of the respective guarantee limits of respective banks and also an additional charge of 1.8 per cent bank commission burden adding to the cost of import material. FIEO had urged CBEC to exempt importers from submission of bank guarantees in case of each and every imported consignment transfered under the bond movement, as required by customs.

Explaining the Customs' refusal of bonding facility to imports made by traders, Mr. Rekhi said that grant of any bonding facility to traders only meant deferment of revenue collection, which is not justifiable. "Even the U.S. has withdrawn such facility of bonded warehouses to private traders", he said.

Dealing with the complaints regarding customs' recent stipulation that importers should produce manufacturers invoice (vide: notification 44/90), Mr. Rekhi agreed to examine a suggestion for shifting the subject from under Rule No. 10 to Rule No. 8. Mr. V.K. Gupta, collector of customs at Bombay Port, promised to continue to deal with the traders' bill of entry promptly if they give a declaration, under the provisions of the relevant notification, to the effect that they were unable to produce the invoices.

Dealing with another complaint by exporters of silk fabrics that customs is holding up large consignments of silk yarn of dupion quality imported under REP licences, under the duty exemption entitlement certificate (DEEC), scheme, even though the licences had been earned against export silk fabrics (mulberry quality), Mr. A.K. Lakina promised to initiate a proposal to clear the consignments on payments of normal duty. On the issue of excise duty refunds of more than Rs. 200 crore due to

various claimants, Mr. Rekhi said that the previous ministry at the Centre had decided not to pay them because the producers had already recovered them from customers. "Unless the government changes the decision, the question of payment of dues does not arise".

Mr. Rekhi promised that the CBEC will seriously examine a proposal to encourage indigenous manufacturers to supply machinery to 100 per cent export-oriented units (EOUs) at nil rate of duty against the furnishing of CT-3 Form. He, however, brushed aside yet another plea of 100 per cent EOUs against the withdrawal of notification 293/88-CE on the provision for sale of goods to domestic tariff area.

Mr. Rekhi declared that hence-forth the Customs department in Bombay would ensure that all laboratory test of samples drawn from export consignments would be made available within 45 days in at least "75 to 80 per cent of the cases". Eventually, even this period would be shrunk to a few weeks. He also disclosed that the Customs had reduced the frequency of sample testing to as far apart as once in two years, in most cases.

Mr. J.G. Kanga, chairman of ECGC, brushed aside a plea for extending insurance cover for exports to Nigeria saying that the insured overdues from that country presently totalled Rs. 80 crore. However, in cases of exports where the concerned banks holding letters of credit have sufficient foreign exchange reserves for remittance, ECGC would consider offering insurance covers for that country on a case-to-case basis.

Earlier, Mr. Rekhi disclosed that in a random checking conducted recently of 18 containers, Customs in Madras found undeclared cargo in as many as 16 containers. In a similar checking of two containers in Bombay, Customs have found undeclared goods, revealing that such frauds are place on alarming scales. He ur importers and exporters to brin notice of the authorities the b ments in both the trading comm well as in the Customs departme lier, Mr. Ramu Deora pointed ou Customs officials the need to trust in the export community, b the number of black sheep is neg The government should not vi the large majority of honest bu men for no fault, of theirs, he

INFLATION AT 10.3 PER C

Inflation based on the variatio official wholesale price index co to hover in the double digit rea worked to be 10.3 per cent dur week ended November 24, even index (based 1981-82) touch another peak at 184.5. The index previous week was 184.4. Highe of footwear made the index for and leather products look up. I in prices of sodium phosphate, chemicals and organic pigments up the index for chemicals and ical products. But the prices of and castor oil declined. Higher pr castings and spun pipes jerked index for basic metals, alloys and products.

COAL SUPPLY TO POWER PLANTS UP

Coal supply to the power sec recorded a 5.6% increase from A October this year over the corre ing period of 1989, according t India Ltd. (CIL) sources. The s said the total supply during the was 58.76 million tonnes as 55.64 million tonnes during th seven months of the fiscal yea

The power sector accounted much as 56% of the CIL's despatches, the demand from th sector in 1990-91 stood at 108.(lion tonnes.

Forex for public sector trading units stopped

With the country increasingly in a ign exchange squeeze, the Union nce ministry has stopped release of ign exchange to all public sector ing units for undertaking imports. units have instead been told to go or short-term credit in the form of kers' acceptances (BAs) or for sup-rs' credit.

The finance ministry had earlier ed trading units to seek its permis-n before undertaking any import in er to ensure that adequate foreign hange is available to back up the orts. Ostensibly, because of the ty coffers, the idea was to stop those orts which the country can do with-

But the finance ministry is obviously in a position to veto essential orts like fertilisers. Therefore, it has ected the trading agency concerned e Minerals and Metals Trading Cor-ation Ltd.), to either extend its short-m debt limits and negotiate with the nks for funds or go straight for sup-ers' credit. The ministry had even proved extension of short-term credit nits by an additional $200 million in der to enable MMTC to undertake nding imports of fertilisers.

The corporation's earlier credit limit s $750 million. Pertinently, the banks ve shown their inability to garner ort-term credit in the intenational arkets on account of the current low edit worthiness of India.

In the past, additional sanctions had ways been forthcoming. There have en instances where a combination of rect foreign exchange release and gher short-term limits were utilised to ke care of import bills.

The finance ministry's rejection of reign exchange allotment was felt utely because of lack of back-up credit from the banks. Therefore, for the first time, MMTC has been forced to resort to suppliers credit for import of di-ammonium phosphate (DAP). The corporation will also extend suppliers credit period for the import of phosphoric acid and ammonia from 60 days and 45 days respectively to 180 days. In all, about Rs. 100 crore of phosphatic acid imports, have to be undertaken. MMTC is likely to insist on 180-days suppliers' credit for all imports undertaken through this instrument of financing.

WORK ON SPONGE IRON PLANT OF GOLDSTAR APACE

Goldstar Steel and Alloy has made impressive progress in the implementation of its 2.2 lakh tpa sponge iron project at Malliveedu in Vizianagram district. Civil works are in an advanced stage and mechanical erection will commence shortly. The plant is expected to go into production by mid-1991.

The Rs. 124.50-crore project has been promoted by Mr. N. Krishna Mohan and Mr. P.V. Prabhakar Rao and associates. The company has entered into a technical collaboration with Mannesmann Demag of Germany. The company's sponge iron plant is based on the Krupp Codir direct reduction process and the collaborators have given necessary performance guarantees. State-of-the-art technology has been adopted to suit Indian raw materials. Critical equipment for the plant is being imported from Mannesmann, and major indigenous equipment is being procured from Bucau Wolf, associates of Krupp. The Rs. 124.50 crores project is being financed by rupee term loans of Rs. 66.08 crores, foreign currency loans of Rs. 16.92 crores and equity capital of Rs. 41.50 crores.

Aluminium exports may fall short of target

Aluminium exports this year may be much less than the planned level of 48,000 tonnes, the Secretary, Department of Mines, Mr. P.K. Lahiri, said on December 5. This is because the international prices of aluminium, which had been firm when the exports were planned, have declined now.

As a result, "our indigenous producers cannot effectively compete in the international markets", Mr. Lahiri said while addressing a national workshop on "Non-ferrous metals", organised at New Delhi by the Confederation of Engineering Industry (CEI). The Secretary dispelled the impression the industry was facing a shortage of aluminium owing to large quantities of the metal being exported.

He, however, admitted that a temporary setback might have developed owing to the export obligations of the National Aluminium Company (NALCO). He pointed out that even the temporary shortage would be eliminated as the planned level of exports are not likely to be achieved. In the long run, however, large capacities had to be created as the demand for this metal grew every year by five to six per cent.

The Government was already planning capacity additions to exploit the country's large bauxite deposits of about 2,650 million tonnes to the maximum, the Secretary informed the gathering. The industry on its part would have to aim for higher capacity utilisation. He also sought to dispel the impression that there was a shortfall in the availability of copper in the country.

There were adequate stocks with both MMTC and the public sector Hindustan Copper Ltd. On the other hand, the offtake was much less than the planned level, he complained. However, the Chairman of the CEI raw materials committee, Mr. Subodh Bhargava, clarified that the slow-down in offtake was due to disruptions in the political situation of the country and also due to problems like transportation

In the case of copper, again, the capacity utilisation was very low. There was a need for prospecting and expanding capacities as, at present, about 65 per cent, of the demand was satisfied by imports, he said. The capacity expansion in the Eighth Plan was likely to be 10,000-15,000 tonnes, which was not adequate.

In the case of other major nonferrous metals like zinc and lead, the Government had plans to expand capacity. The demand satisfaction of these metal is likely to increase to 85 per cent and 75 per cent respectively, he added.

SAIL CRUDE OUTPUT UP

The five-integrated steel plants under the Steel Authority of India Limited (SAIL) at Bhilai, Durgapur, Rourkela, Bokaro and Burnpur registered a growth of five per cent in hot metal and six per cent in crude steel output in November over the respective levels in the corresponding month of last year, says an official release.

The production of crude steel in SAIL plants in November at 750,000 tonnes was the highest ever for the month since inception. The output of hot metal and saleable steel during the month was 827,000 tonnes and 629,000 tonnes respectively.

Bhilai steel plant produced 289,000 tonnes of hot metal, 295,000 tonnes of crude steel and 233,000 tonnes of saleable steel in November. The production of crude steel and saleable steel was the highest ever for the month of November.

The modernisation and capital repairs of blast furnace no. 6 were completed in a record time of 162 days against the scheduled 180 days. This will improve the productivity of furnace by over 20 per cent. Bokaro Steel Plant turned o the best November production sin inception and produced 285,000 tonn of hot metal, 244,000 tonnes of cru steel and 220,000 tonnes of saleab steel recording a growth of 13 per cer 11 per cent and nine per cent respe tively during the month, over that November, 1989.

MINERALS ENGINNERING SYM POSIUM FOCUSES ON THE 90'

MINPREP 91, the Minerals Engine ering Society's second internationa symposium and exhibition on mineral engineering, will be held at the Dor caster Exhibition Centre U.K., from 9-1 April 1991.

'Minerals Engineering — The Chal lenges of the 90s, is the theme chose for the Symposium to highlight th demands which engineers and manag ers are likely to face in the next decade

Papers for MINPREP 91 have bee invited in the subject areas of recen developments in minerals engineering the expanding market place for miner als, the energy scene, minerals engine ering and the environment, quality management, cost-effectiveness and education and training.

An integral part of MINPREP 91 is the Exhibition being held alongside the Symposium where suppliers to the min erals preparation and processing indus try will have an opportunity to display their products and services in a venue where the facilities are also suitable for large machinery. In addition, MINPREP 91 is the only exhibition in the UK in 1991 being supported by British Coal and the Chamber of Engineers.

Further details on MINPREP 91 are available from the Minerals Engineering Society's appointed organisers Mining Industry Promotions Ltd., 28 Church Street, Rickmansworth, Hertfordshire WD3 1DD, U.K. Tel.:0923 778311 Fax: 0923 776820

Science Briefs

VITRO PROPAGATION OF EM

niform plantations of "neem" *ıdirachta indica)*, a tree with ıense medicinal, agricultural, indu- l and commercial importance, can aised through tissue culture, recent arch indicates.

cientists from the tissue culture ɔratory of the Faculty of Science, , University, Baroda, have reported cessful *in vitro* propagation of *Azad- chta indica*, using small, excised leaf cs. They reported their findings in the dian Journal of Experimental Bio- y".

Usually neem plants are raised ɔugh seeds, but the seeds remain ble for only two weeks after matu- on. Also, trees raised through seed mination exhibit considerable vari- ɔn.

In their experiments, the Baroda earchers collected healthy leaflets m superior neem trees, sterilised m thoroughly and punched small cs from them.

They cultured the discs in a special dium supplemented with various ıcentrations of plant growth hor- ɔnes.

The excised leaf discs produced -12 adventitious shoot buds within ır weeks. Addition of adenine sul- ate had a synergistic effect and 18-20 ds were formed.

The scientists next isolated shoot ds and grew them separately on other medium, where each bud devel- ed into a healthy shoot.

The shoots gave rise to 12-15 plan- ts within six months. After acclimat- ıtion to the natural surroundings, the plantlets were transferred to pots, the report by K. Ramesh and M.A. Padhya says. The standardised procedure can serve well for clonal propagation of neem trees.

—PTI Science Service, Oct. 16-31, 1990, p. 1

COMPUTER-BASED SYSTEM FOR DATA ON IRRADIATED FUEL

A computer-based system, 'Candor', has been developed for automatic aquisition, storage and analysis of data on non-destructive tests on irradiated nuclear fuels, by the electronics and radiometallurgy divisions of the Bhabha Atomic Research Centre, Bombay.

The system, built around a small inexpensive computer, is highly flexible and hence adaptable to testing situation demands, say BARC scientists V.K. Madan and K.C. Sahoo.

The programming language used is instrumental BASIC. The system support includes disk file management for easy manipulation of data files and programmes. It also has facilities for string handling, array handling and matrix manipulation.

During post-irradiation examination (PIE) of nuclear fuel a number of non-destructive tests are carried out. Since it is time consuming and also costly to repeat a fuel irradiation experiment, large amount of data is collected during PIE, disregarding the question of immediate interest, according to Mr. Sahoo. In case of experimental fuels preirradiation measurements are made for comparing with post-irradiation measurements.

The system has been utilised for profilometry, eddy current testing and gamma scanning measurements.

— PTI Science Service, Oct. 16-31, 1990, p. 2

MAGNESITE PROJECT YIELDS REMARKABLE RESULTS

An ambitious biotechnology project to purify magnesite ore using a bacterium has yielded remarkable results in field trials.

The five-year project, sponsored by the Department of Biotechnology (DBT) in collaboration with Burn Standard Company Limited, a Calcutta-based private firm, is expected to drastically reduce India's dependence on foreign countries for high grade magnesium.

The bacterium that is all set to transform India's magnesium scenario is *Bacillus licheniformis*. Of the 25 subgroups of this bacillus isolated scientists have found six that are of significance in purification.

Through microbial leaching, the costs are negligible and India's huge magnesium deposits could be completely utilised.

Though nearly 10 per cent of the world's magnesium deposits are found in India, most of them are unsuitable for specialised industrial processes. While 60 per cent of the deposits are found in Salem in Tamil Nadu, 30 per cent are located in Almora in Uttar Pradesh.

Field trials done so far have boosted the morale of workers on the project and if the trend continues, India may well be credited with developing a technology for the 21st century, say DBT scientists.

Though the microbial leaching process is common knowledge, no country has so far taken it up on a large scale, according to the scientists. In this sense, India is pioneering field applications in the purification of magnesium ore, they say.

The main impediment in the use of magnesium for industrial purposes is the presence of silica as contaminant. Most of the magnesium ores found in the country are contaminated with at least six per cent of silica, while some even have 20 per cent silica. The idea is to reduce the contaminants to less than one per cent. Conventionally, this has been done by processes that are cumbersome and expensive, and therefore unsuitable for large-scale use.

In microbial leaching, the contaminated magnesium ore is crushed and placed in containers. The ore is steamed to remove all superficial impurities including other kinds of bacteria that may be present. The silica, however, remains intact.

The bacterial medium is then introduced into the containers while scientists sit back to watch *Bacillus licheniformis* set to work. The bacterium proliferates and spreads all over the ore and then proceeds to attack the silica.

The silicic acid that is then formed is easily washed away. The magnesium that results has a low percentage of silica.

For a project that started in July 1989, scientists say that progress as of now is excellent. With the results that have been obtained, it is possible to straightaway mix the purified magnesium with the imported high-grade variety (silica content less than one per cent) and use it for specialised industrial purposes.

— PTI Science Service,
Oct. 16-31, 1990, p. 2

PURE "GHEE" IS ANTI-CANCEROUS

"Ghee" (clarified butter or butter oil), considered for centuries as the best source of edible fat and essential for good health and longevity, has now been confirmed by scientists as having anti-cancerous properties.

Dr. R.P. Taneja and Mr. T.N. Murthy from the Institute of Rural Management, Anand, Gujarat, have confirmed that ghee contains rich sources of anti-cancerous conjugated linoleic acids (CLA).

Ghee is made by heating butter or cream. According to the scientists, milk proteins provide hydrogen to linoleic acid during the heating process and catalyse the formation of CLAs —a process somewhat similar to the microbial enzymatic reaction in the rumens of cows and buffaloes.

The total CLA content of milk fats extracted by solvents from milk of cows and buffaloes is about 0.6 and 0.5 per cent respectively. The solvent extraction method does not involve either fermentation in the presence of butter milk or heating at high temperatures. Therefore, the CLA content is due to only the natural enzyme action in the rumen.

The Anand researchers found that microbial fermentation during the formation of curd increased the CLA content to 1 per cent. After melting butter at 110 degrees celsius by the traditional method, the CLA content was found to be 1.1 per cent in cow ghee and 1.3 per cent in buffalo ghee. When the process was carried out at 120 degrees celsius, the CLA content improved further to 2.5 and 2.8 per cent for cow and buffalo ghee respectively.

In the cream-butter method the CLA levels were 0.9-1.8 per cent in cow and 0.7-1.6 per cent in buffalo ghee made at 110 degrees and 120 degree celsius respectively. In the direct cream method it was 0.6 and 0.7 per cent only.

Repeated experiments confirmed that the traditional method of taking out butter from the curd and heating it to 120 degree celsius for making ghee was better than the methods followed in commercial dairies.

— PTI Science Service,
Oct. 16-31, 1990, p. 3

REMOTE CONTROL FISSIO GAS ANALYSER

A remote controlled fission gas lyser (FGA) to characterise gase solid matrices has been develope engineers at the Indira Gandhi Ce for Atomic Research (IGCAR), pakkam.

Qualitative and quantitative dete nation of gases occluded in a matrix is necessary for characterisa of materials used as fuels or stru components in a nuclear reactor.

An important task of the FGA determine quantitatively the reta functions of fission gases xenon krypton in test material after their charge from a fast breeder test rea The data is required to evaluate swelling during irradiation, IGCAR scientist, Mr. Sitaram Da

The FGA is already in operation C.K. Mathews, Head, Radiochemi Programme of IGCAR, said.

Trapped gases may be present in system, either atomically disperse the matrix, or as intra-granular intergranular bubbles. Besides estim ing the total quantity, scientists atte to distinguish and estimate fractions up with each type of entrapment.

"Thus a study of release rates consequent outgassing pattern as a fu tion of temperature and time may h in the detailed characterisation entrapped gases," Mr. Dash said.

One simple way to determine retained gases is by thermal desorpt under vacuum at elevated temperatu followed by dynamic monitoring w the help of a quadruple mass spectro eter. "We developed the prototype ba on this approach and it was sucessfu operated", Mr. Dash said.

— PTI Science Serv
Oct. 16-31, 1990

VENT EXTRACTION OF HENIUM

searchers of Jadavpur University, tta, have devised a simple method tract ruthenium, a hard, brittle, h white metal that is used as a cat-

e new solvent extraction technique omes many of the problems of the ntly used multi-step process, and ises to be economically viable, the tists report.

e researchers isolated ruthenium its aqueous chloride solution, in orm of a complex with cinnamoyl-oxamic acid. The aqueous chloride ion was formed by dissolving nium in 0.1 molar solution of ochloric acid.

ne researchers next treated the ered aqeous solution with amoyl-hydroxamic acid to obtain an nic extract. Their experiments ved that ruthenium extraction is pendent of chloride ion concentra-

— PTI Science Service,
Oct. 16-31, 1990, p. 4

VANCED PETROLEUM TRACTION PROCESS

ustralian petroleum industry scient- have made a significant advance in echnology for extraction of oil from ng wells.

hey have devised a process that uses teria already existing in oil wells. life cycle of the bacteria produces tural detergent that frees oil from spaces between earth particles so it can flow freely out of the well n water is pumped in to provide ssure.

n the past, gas or water treated with mical surfactants have been pumped wells to try to extract oil when the l gusher has faded away.

Although this does enable the extraction of some oil, it still leaves much in the ground which, in the past, it has not been possible to recover.

Oil seldom exists in pure form as a vast lake under the ground. Even in situations where there is an initial gusher, the pressure will quickly drop so low that it needs to be pushed out.

Sand and rock hold oil grains between them rather like a sponge holds water. When the sponge stops dripping water there is till a lot of water left in it but it needs to be squeezed out.

On a global average, production from an oil reservoir usually ceases when only 30 per cent of the oil has been brought to the surface. The figure can vary from well to well depending on geology.

In the past, it often has been uneconomic to force out oil with the known technology. In addition, the surfactants used in the past are minimally biodegradable and can pose environmental hazards in the long run.

However, the bacterial surfactant developed by the Australian researchers based in Canberra have been dramatically successful in trials on Queensland's Alton field. The trial was able to boost production by about 50 per cent for a year with no end in sight to the increased flow.

The breakthrough follows 10 years of research in the area. The researchers injected the Alton oilfield well with a solution enriched with natural bacteria extracted from the oil reservoir. The technique extracts bacteria, provides them with nutrients so that they will grow and multiply and then returns them to the oil bearing rocks far below the surface.

A patented injection and dispersal system is used to introduce small quantities of the chosen micro-organisms into an oil reservoir.

—PTI Science Service,
Oct. 16-31, 1990, p. 13

INNOVATIVE TECHNOLOGY BY INDUSTRIAL PIPE MAKER

A South Australian pipe-making company that has already made innovative advances in PVC pipe technology is conducting research into another form of reinforced PVC which may have a significant impact on the international scene.

The new concept is a spirally wound ribbed PVC pipe reinforced with steel strip. The pipe may have wide application in areas using gravity flow pipes such as stormwater drainage and culverts.

The company which is developing the new pipes is Rib Loc Group Limited, a listed public company, located in Adelaide. The pipe called 'Rib Loc' is formed by extruding PVC in a continuous sheet about two metres wide with reinforcing rib on the external surface, a smooth inner surface and male and female grooves along the two sides which formed a mechanical locking device.

The company had developed a series of machines which wound the PVC into a pipe, inserting adhesive into each edge locking device. The pipe exits the machine in a continuous length. The machines could be taken to a work site where they could form a completed pipe for a distance of up to about 100 metres, depending on pipe diameter.

They can produce piping from 100 mm to two metres diameter. The fact that pipes up to 200 mm in diameter can be formed in lengths up to 100 metres makes them ideal for repairing broken pipes at relatively low cost. They can be expanded *in situ* to fit inside the old pipe. The company is developing the product further by incorporating a facility to include a rust-resistant metal strip

which fits snugly between the external ribbing.

The original ribbed locking pipe, developed in the early 1980s, is marketed around the world. It is taking over from spirally wound cardboard or steel pipes, and is competing with concrete pipe.

The spirally wound PVC pipe is lighter and more durable than spirally wound cardboard and steel tubes. It is easier to use on site and easier to strip from the concrete column after setting. One of the potential uses for the steel reinforced pipe is creating voids or channels in reinforced concrete structures.

The addition of the steel band will double the strength of a PVC-ribbed spirally wound pipe. There are some interesting geomechanics applying to pipe technology. For example, when flexible pipes were properly installed in trenches with compacted soil backfill, the pipe deflected under load and interacted with the soil arch.

The resulted pipe-soil system was very strong and in theory, once the soil arch was formed, the pipe itself could be removed leaving a channel of almost undiminished strength.

This meant that lightweight PVC pipes could be used as culvert pipes under roadways at suitable depth, as the pipe and soil system had the same strength as concrete piping.

— *PTI Science Service,*
Oct. 16-31, 1990, p. 14

PROCESS TO POLYMERISE COMPOSITE MATERIALS

A new process developed by the French company, Aerospatiale, does not use heat for the polymerisation of composite materials. The composite part is scanned by an electron beam, causing an immediate interaction between the radiation and the material, whereupon polymerization takes place with no rise in temperature.

Ionisation has apparently never yet been used for material processing, the "French Technology Survey" said. The process is based on research in molecular chemistry. The energy of the electron or x-ray beams breaks the fragile bonds and releases the chemical radicals which then recombine causing polymerization.

This technique is claimed to have many advantages in industry. One of them is in time-saving. A jet engine with a "wound round" structure, necessitating polymerisation for several days, will be ready in a few hours since, with ionizing beams, the action on the resin is immediate.

The result is lower cost, and the technique is very flexible to apply: repolymerization and local polymerization is also possible. The lack of any rise in temperature means that there is virtually no expansion of metal components. Metal inserts can be incorporated and the dimensional quality of parts is perfect from the outset.

The complex built by Aerospatiale following the successful polymerization by the above method consists of a 20 kW electron accelerator capable of polymerizing carbon composites up to a thickness of 32 cm, a compartment for polymerization of parts four metres and 10 metres long and a programmable automatic system to pass the entire surface of the components in front of the accelerator in an appropriate manner.

— *PTI Science Service,*
Oct. 16-31, 1990, p. 16

PRODUCTION OF STRUCTURED FOAMS

The demand for buoyancy materials suitable for use at great depths under water and hence combining lightness with compression resistance has catalysed the French Petroleum Institute to develop the production of struct foams.

Structured foams, which can re buoyancy virtually permanently, d to water depths of 5000 metres, are tributed in the form of modules or ques along submerged pipes. In way, the "French Technology Surv said, the foams constitute a sor buoyancy harness, the volume of wh is calculated to give the piping sys a virtually zero apparent weight in water regardless of depth.

A structured foam is a multi-cell composite material obtained by add specially shaped cells to a basic bin This is done by incorporating holl spherical particles (microbeads of gl and micro-beads of reinfored resin) a thermosetting resin. The resin mat once hardened, must be sufficien rigid and strong to protect the holl particles and prevent them from be crushed or imploding under pressu

Since the ultimate use of these mat ials involves long immersion under su stantial hydrostatic pressure, two ot important properties are their resistan to hydrolysis and water absorpti under the pressure of the resin, in ord to guarantee a long life for these co posite materials.

Prior calculations were done of t correlations between the rate of wa absorption at different pressures and t chemical nature of the resin or the qua ity of the interface between the resin a the hollow particles. This has led to t formulation of a new resin, special adapted for the production of structur foams.

This resin has numerous advantag (low viscosity, low water absorption an low density) compared with the epox resins so far used for this kind of appl cation.

— *PTI Science Servic*
Oct. 16-31, 1990, p. 1

New Products

OSCOPIC DIAMONDS FOR STRIAL USE

Kay Industrial Diamond Corpo- USA, has been the forerunner in rld of "Microscopic Diamonds" r 40 years and produces the very microscopic diamonds with great tions to meet the changing needs arious industries dictate.

'SJK-5' microscopic diamond r with a strong, whole monocrys- type crystal offers the ultimate in factured strength. The SJK-5 crys- s extremely efficient metal bond ion with extra strength and resis- to breakdown at high temperature s recommended for the toughest bond applications where more utting action is required, enhanc- better finish. It is available in 64 idual microscopic grades.

e 'RJK-1', a new product for the e has been designed for application in bonded wheels and where a soft hing and lapping action is required.

e Kay 'Natural Diamond' with its ue physical and chemical character- and guaranteed purity is available arious microscopic grades. The ural diamond' has a strong, blocky, shaped particle with smooth sur- s & sharp edges. In abrasive tests knoop indentation tests, the natural ond particle is measured at 10 on Mohs scale. It is an excellent insul- with graphitisation at 600°C in air.

Kay Industrial also manufactures a plete spectrum of other microscopic nonds and several innovative pro- ts such as a 'Liquid Diamond vder', Electro-plated Nickel/Copper l micro diamonds, Synthetic dia- nd abrasive slurries, etc. All 'Kay' ducts are of consistently high qual- with very exacting standards to

For further information contact: M/s. Nikunj Eximp Enterprises Pvt. Ltd., Sri Joravar Bhavan, 93, Maharshi Karve Road, Bombay 400 020.

COMMERCIAL CARBON COMPOSITES, C³

Fiber Materials, Inc. (FMI), a world leader in the development and fabrication of advanced carbon-carbon composites, has developed a new low cost carbon compsite product line, 'C³' for industrial applications.

'C³' is a two directional fibre reinforced composite designed to meet stringent structural and high temperature requirements. 'C³' possesses all of the classic properties of graphite and has lower density, superior mechanical properties and longer operational life. 'C³' has high resistance to thermal shock, high temperature stability upto 2000°C, low thermal expansion and low transverse thermal conductivity, corrosion resistant, high resistance to fracture, is electrically/thermally conductive and machines easily.

'C³' is used for thermal barriers and heating elements by a number of hot isostatic presses and it meets all fastener requirements in industrial applications. C³ is used for thermal barriers and heating elements by a number of hot isostatic presses and it meets all fastener requirements in industrial applications. C³ is fast replacing currently used graphite materials in heat treating/furnace manufacturing & in allied applications.

In standard form it is available in plate form or in cylindrical style in a choice of two grades (standard grade and fastener grade).

For further information contact: M/s. Nikunj Eximp Enterprises P. Ltd., Sri Joravar Bhavan, 93, Maharshi Karve Road, Bombay - 400 020.

PROCESS CONTROL INDICATORS (METERS)

Gujarat Electrical Instruments, manufacture customised measuring instruments for process control industry. Instruments manufactured have analog indication for inputs 4-10 mA, 1-5 V and scaled 0-100% or any other customised scale. Analog instruments are shock, vibration & water resistant & can be operated from -20°C to +55°C. These instruments provide reliable performance, high quality and precision indication required in chemical process, water treatment, food and beverage processing application. Accuracy is 2% full scale.

For further information contact: M/s. Gujarat Electrical Instruments, Plot No. 624, Opp. Krankur Lab., GIDC Estate, Naroda, Phase IV, Ahmedabad 382 330.

BRIGHT CYANIDE ZINC PLATING PROCESS

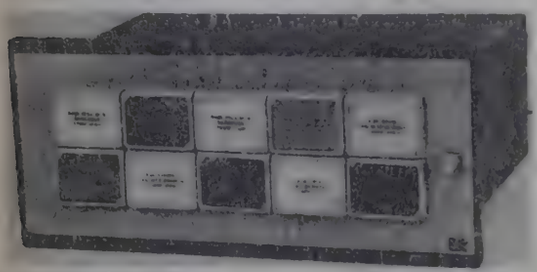
Daulat International, the pioneers of "Tinglo" Bright acid tin plating process have now introduced "ZinkGlo-CY", bright cyanide zinc plating process. The "ZinkGlo-CY" can be used for zinc plating from standard and medium cyanide based plating solutions for rack and barrel operation and it plates exceptionally bright levelled and ductile deposits with uniform covering and high throwing power. The process solution remains stable at high operating temperatures and also over longer shut down periods. The bright cyanide zinc plated parts also accept chromate treatment readily. Complete technical details of the process, bath preparations, operating method, maintenance, etc. are provied by the manufacturer.

For further information contact: M/s.

Daulat International, 167, A to Z Industrial Estate, Fergusson Road, Lower Parel, Bombay - 400 013.

ALARM ANNUNCIATORS

It is an audio-visual system used for instant warning of any abnormal condition occuring in any industrial process. Such indications enable to protect valuable systems and equipments in process, power and metallurgical plants. "Instalarm" offers the complete range of operational sequences in annunciation



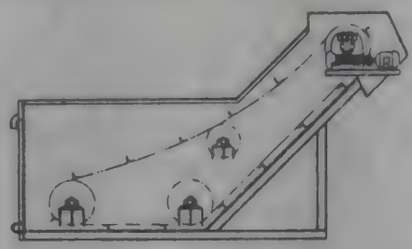
system based on C-mos/TTL technology. These units are manufactured to meet any number of parameters wherever 'Change of State' can occur. All types of structures namely flush mount, split architecture, wall mount, blind unit/panel with logic, floor mounted cubicle panel, pedestrial mounting and intrinsically safe annunciators for hazardous area applications are available. A hooter is provided to complete the audio-visual system. All such units can be supplied to suit any of the following input voltages 110V/230V AC - 50Hz + 10% and 24V/48V/50V/110V/220V/250V DC + 10% (AC ripple - 10% max). AC failure DC alarm or vice-versa facility can be provided, if required.

For further information contact: Instalarm Control Products, 772, Shriram Bhuvan, Tilak Road, Opp. B.E.S.T. Office, Dadar T.T., Bombay - 400 014.

SLUDGE CONVEYOR

Indiana's Sludge conveyors are designed to remove heavy organic solids from industrial slurry/wastes. They are generally used in fertilizer, chemical, iron and steel, thermal power plants (ash removal/extraction), sewage treatment, engineering and various other industries.

The equipment consists of a specially designed tank with scrappers mounted between heavy duty continuous chains. The tank is provide with a specially designed sealing arrangement to prevent leakage. The tank is suitably designed so that the inclined portion provides access for the material to be discharged at any convenient height.

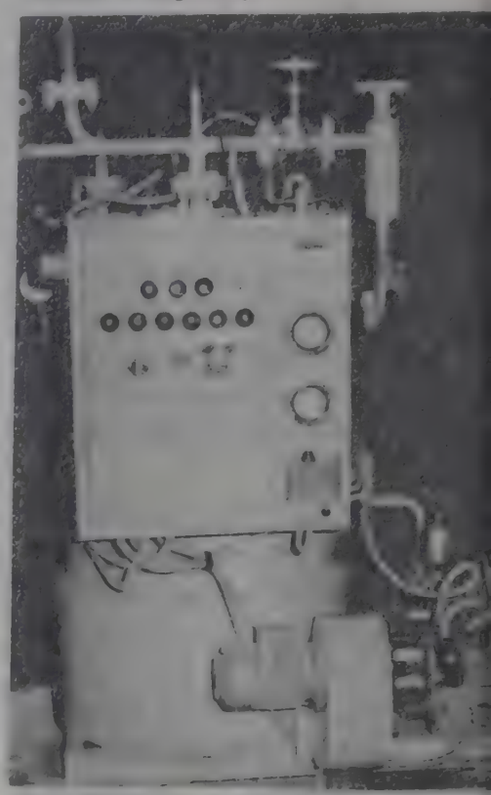


The liquid along with heavy inorganic solids is first allowed to settle down for a calculated period of time, but in some cases if the solids are very heavy it can operate continuously. The settling time varies for different materials depending on their characteristics. After the heavy solids settle down, the conveyor is started. The scrappers, scrap the material settled at the bottom of the tank, which is effectively discharged. In case of very sticky material special cleaning arrangement is provided at the discharge. The complete operating cycle can be made automatic by introducing a timer device, i.e. after a calibrated time, the conveyor will automatically start and stop.

For further information ˇ M/s. Indiana Engineering Works (Bombay) Pvt. Ltd., 12, Hingorani House, Dr. Annie Besant Road, Worli, Bombay - 400 018.

"THERMOMET" FUEL EFFICIENT BOILER

"Thermomet" Fuel Efficient Boiler is a unique high pressure, forced draft, forced circulation, water tube package, non-IBR coil type, fully automatic, oil fired boiler which gives high quantity of steam at a lower fuel cost per kg of steam. It's high efficiency is because of compact three pass design and pe combustion with pressure jet burn suitable capacity.



"Thermomet" boiler is designed such a way that it requires minimum space & can be installed and comm sioned within two hours. "Thermom boilers cater to the need of various fo chemical, pharmaceutical, rubber laminate industries etc.

For further information contact: M Thermopac Boilers, 1, Dharam Pala Shantivan, Near National Park, Bori (East), Bombay 400 066.

BLOW MOULDING MACHINE

Polymechplast offers a broad ran of blow moulding machines to serve t needs of the plastic industry. The machines are based on advanc know-how and are noted for their pe formance, productivity and operati economy. Features incorporated a Parison programmer to provide ev parison thickness throughout the lengt DC with thyristor control screw dri provides adequate screw speed, doubl head to obtain high production, botto blowing facility to suit small articl in top-bottom cavity moulding, sele tion in separate heads for PVC a HDPE or common head and choice

atic or hydraulic operation es.

further information ˇ M/s. Pol-last Machines Pvt. Ltd., 775, Makerpura, Vadodara 390 010.

TORING OF WATER LITY

T-3001 is a compact, accurate and e turbidity transmitter. It is oper- means of push button key board, ligital display and a user-friendly which is available in most Euro- anguages. All parameters, such as ing range, alarm limits/contacts, t range, smoothing etc. are fully ammable.

plexing

e MET-3001 Turbidity Transmit- capable of simultaneous and inde- ent multiplexing of a number of inputs. The operator is informed times of the simultaneous opera- f many steps in one process using ame instrument, or can operate a er of independent processes.

ors

vo different sensors cover a very variety of applications.

ersion sensor WP-301

e WP-301 is used mainly in the cipal and industrial waste water treatment and water preparation plants. The unique design of emitter and detector in one plane makes it possible to install the probe as a dip (immersion) probe for use in channels, outfalls etc. or as an insertion probe mounted in a plastic Y piece.

The WP-301 is equipped with a mechanical cleaning device, a preamplified and daylight filter, and uses IR scattered light measurement according to the ISO 7027 standard.

Operating ranges with WP301: 0-3...0-20 in 1 NTU/FTU steps, 0-50, 0-100, 0-200, 0-500 and 0-1000 NTU/FTU.

Insertion Sensor PP-301

The PP-301 is designed for use in closed pipes and vessels, etc., found in industrial applications and processes. It has been designed for high temperature, high pressure, high alkalinity or acidity and solvent use in such processes as fermenters, reactors, bio-reactors etc. It is manufacturerd in stainless steel and can be steam cleaned (C.I.P.).

The probe operates by IR-backscattered radiation. The radiation is transmitted along fibre optic cables from the emitter and to the detector. The detected signal is converted to an electrical impulse and transmitted to the electronic unit of the instrument. The operating ranges of the PP-301 are: 0-10-0-20 FTU/NTU (in 1 FTU/NTU steps) and 0-50, 0-100, 0-200, 0-500, 0-1000 and 0-4000 FTU/NTU.

For further information contact: BTG Kalle Inventing AB, P.O. Box 96, S-661 00 Saffle, Sweden.

SELF-DRIVEN MIXER DEVELOPED

Adding to the undoubted success of its novel mixing system, the Cavity Transfer Mixer (CTM), built for the extrusion industry, Rapra Technology Limited, the British research and development company specialising in plastics and rubbers has now produced a versatile self-driven version, suitable for smaller machines and for experimental testing and proving of mixes.

The self-driven CTM takes its main polymer feed from a conventional extruder (up to 30 mm screw diameter), operates at similar or higher rotational speeds (driven through its own 1.5 kW DC motor), and can handle a wide range of distributive mixing tasks.

It can be used for masterbatching, polymer blending, and homogenising. Fibres may be incorporated through an addition port, and liquids (such as tackifiers, colours and accelertors) can be injected directly ahead of the CTM and die head. Varying the speed of the unit also allows optimum mixing levels to be selected (at high rotational speeds, high levels of liquid additives are possible, producing flexible compounds such as sealants and adhesives). By using two separate feed extruders, polymers requiring completely different processing conditions can be blended together.

The system is mobile, height adjustable, and is available with various modifications to suit customer requirements.

For further information contact: Dr. Martin Gale, Rapra Technology Limited, Shawbury, Shrewsbury, Shropshire, SY4 4NR, England.

Highlights in Chemical Technology (Part 2)

EW FINNISH PROCESS FOR E GAS DESULFURIZATION

e Finnish Company Tampella pere, Finland), is installing a onstration unit of its new Lifac gas desulfurization plant at the ar river thermal station owned by atchewan Power in Canada. In the process, powdered limestone is ted into the upper portion of the r furnace to produce calcium oxide. then reacts with sulfur dioxide in flue gas to form a calcium sulfate der that is easily separated from the gas.

ampella claims Lifac is cheaper to all than scrubbers and is readily licable to any type of boiler. If the onstration unit is successful, Sas-chewan Power will install Lifac in its thermal plant. (*ECN*, 9/24/90, p.

SOLAR CAR BASED ON HIGH FICIENCY PHOTO VOLTAIC LLS DEVELOPED IN JAPAN

A new solar car called 'Phoebus-3' veloped in Japan will be the star raction in the 'World Solar allenge-90' a 3000 km race for ar-powered vehicle across Australia m Darwin to Adelaide. Developed by oxan Corporation (Japan), the car has o wheels in the front and one in the r and weighs only 150 kg. The heart the car delivering power is the system modulus of photovoltaic cells which nvert solar energy into electricity with efficiency of 19.3%, the most effi-ent in the market today. The photo-ltaic cells deliver a total electrical ower of 1.4 kilowatts to a compact gh performance direct-current motor at drives the car. This novel three-hase brushless motor using rare earth agnets weighs only 1.5 kg. The high fficiency photovoltaic cells were eveloped by the Japanese firm under the Japanese government sponsored 'Sunshine Project'. In the near future, the firm plans to mass produce their cells with convertible efficiency better than 20 per cent or double the efficiency of current photovoltaics.

According to reports from the company solar-powered cars will be the first major application of these new cells, while domestic lighting will be the next. A total of 43 teams from 10 countries will compete in the race. The last such race held in 1987 was won by the General Motors Corporation of USA. (*TOINS*, 10/19/90, p. 13).

FUEL CELLS COMMERCIALIZATION ON THE NEAR HORIZON IN USA

A 100 kw solid oxide fuel cell, the larget of its kind to date, will be built by Westinghouse Electric Corp. (Pittsburg, Pa) for Southern California Gas Co. (SCG, Los Angeles). Fuel cells have high overall efficiency (around 80 per cent for solid units) and are non-polluting. They transform reformed natural gas directly to electricity, rather than via combustion. The unit, due for delivery around the end of 1991, will undergo a year of tests, and then be installed in a new housing project. The $ 7 million development is mostly funded by the US Dept. of Energy with SCG contributing about $ 1.67 million and the California Energy Commission (Sacramento) $ 500,000. In a similar project, Pacific Gas & Electric Co. (San Francisco) is to start testing a 100 kw molten carbonate fuel cell by the year end. (*Chem Eng.*, Aug. 1989, p. 48) (*Chem Eng.*, Sept. 1990, p. 25).

NON-CHLORINE PULP BLEACHING ON THE WAY TO COMMERCIALIZATION

The successful results of a process developed by Eka Nobel AB (Surte, Sweden), has taken non-chlorine pulp bleaching a step further. The method, named Lignox, eliminates all elemental chlorine gas use and limits chlorinated organics to less than 0.5 kg/tonne of pulp. Current levels are more than 1.5 kg/tonne. The process which is said not to require major new capital investments, substitutes a proprietary chelating agent for the initial chlorine-chlorine dioxide stage, thereby allowing an increased hydrogen peroxide charge during the following lignin extraction.

Brightness levels of 70-75 per cent ISO allow a minimized secondary bleaching with carbon dioxide.

Eka Nobel claims that pulp quality is similar to that produced by conventional gaseous chlorine methods. (*Chem Eng.*, 9/1990, p. 21).

MITSUI TOATSU CHEMICALS MARKETS A NEW PROPRIETARY NUCLEATING AGENT FOR PRODUCING TRANSPARENT POLYPROPYLENE

Mitsui Toatsu Chemicals Inc. (Japan) has begun commercial production of a high performance proprietary nucleating agent (trade name NC-4) at its Ohmuta factory.

The new agent is capable of making polypropylene (PP) transparent while retaining the weather/heat resistance of the base resin. When added to the resin only in small quantities the agent can produce the desired effect, since it has a higher classification ratio than conventional products do. It has such good compatibility with PP that it hardly bleeds from the resin when the latter is put into moulding processes.

In addition, the new agent serves to improve the synthetic resin's strength, elasticity and dimensional stability. The resin produced using the new nucleating agent had resistance against x rays and is therefore suitable for injection

and plastic cases, both of which are subject to radiation sterilization. The demand for transparent PP resin tolerating radiation is increasing worldwide in response to energetic moves towards preventing AIDS. Polyethylene resin is unsuitable for radiation sterilisation.

In Japan NC-4 has been already approved as an additive to raw material for food containers, packaging material by Japan's Hygienic Olefin & Styrene Plastics Association. In August 1988, the product was formally registered with USA's Food Drug Administration. Potential applications of NC-4 added transparent PP as containers for food, beverage and cosmetics, clothing cases, detergent bottles, disposable injectors, intravenous drip-bags, video cassettes', etc. (*Japan Chem Wk.*, 5/10/90, p. 1).

GRAPHITE DIRECTLY TRANSFORMED INTO B-SILICON CARBIDE

Toyo Tanso Co. (Japan) has developed a technology for transforming graphite material into ultra high purity B-silicon carbide. The company intends to supply B-silicon carbide to jigs for a silicon carbide based diffusion furnace. Employing the new technology, the company controlled the particle size of the graphite material, formed micropores on the surface and inside isotropic graphite produced from the graphite particles and converted the resultant product into B-silicon carbide at a high temperature. The product is impregnated with silicon or coated with silicon using a CVD process.

The two types of products obtained have high thermal conductivity and the CVD type one in particular has strong acid corrosion resistance. Their basic properties are:

Bulk Sp-gravity 3.0
Bending strength 220 mega pascals
Thermal conductivity 48 (100 kg) W/mk.
Vickers Hardness 2600 Hv (100)
Iron 1.9 ppm
Nickel 0.4 ppm
Chromium 0.009 ppm

The company has established technology for forming flat CVD film on the uneven surfaces of target materials. It facilitates production of jigs of complicated shape.

Baking temperature within a diffusion furnace designed to form oxide film upon silicon wafers is able to react 1,300°C along with the increase in the diameter of silicon wafers. In a related development raw material for the furnace is being switched from quartz to silicon carbide.

Conventional type silicon carbide however, contains sintering auxiliaries as impurities and its workability and dimensional stability have not reached a satisfactory level. (*Japan Chem Wk.*, 7/12/90, pp. 5, 8).

PHENOL PRODUCED FROM BENZENE IN A SINGLE STEP FUEL CELL REACTION

Researchers at the College of Engineering, Tokyo Institute of Technology (Japan) have produced phenol from benzene in a single step using active oxygen obtained from oxygen hydrogen fuel cell. The benzene was completely converted to phenol, with the fuel cell supplying electric power without producing carbon dioxide.

The researchers employed as a diaphragm, a glass wool disk containing phosphoric acid and used graphite carrying metal chlorides as a cathode. Subsequently, they introduced hydrogen into an anode chamber, added pure benzene in a cathode chamber, blew oxygen into the latter chamber, while agitating the benzene and short circuited the electrodes used. In this manner, phenol was produced from benzene during the reaction of the fuel cell. They report that combination of samarium chloride and graphite produced the cathode having the highest activity.

As result of this breakthro seems possible to apply the phenol production process to othe of oxidation reaction. The re group claims that it may facilita tial oxidation of cyclohexane, w reported to be difficult when c tional methods are employed. Ph usually produced using benzene nation, cumene oxidation and hexane processes, all of which are ever, complicated and produce sirable by-products. To date, producers worldwide have been for development of a simple p aimed at synthesizing phenol in a step. (*Japan Chem Wk.*, 4/19/90, 8).

DU PONT (USA) UNVEILS A ROUTE TO TETRAHYDRO RAN FROM N-BUTANE

Du Pont Co. (Wilming, Del USA) has completed two multi-m dollar pilot plants to demonstrat step production of tetrahydr (THF) from n-butane. This follo on the firm's introduction two d back of an acelytene formald route that in its turn, replaced a fi process. Commercialization is s Europe in 1994.

The new method begins with port bed oxidation of n-butane to anhydride, followed by hydrogen tion of aqueous maleic acid to T butane oxidation catalyst with attribution resistance is the key first stage providing long term s vity for maleic anhydride and perm the recycle of unreacted butane hydrogenation process directly co aqueous maleic acid to THF ci venting several disadvantages of petitive routes including the isola molten maleic anhydride, and the intermediate butanediol in esterifi steps of organic solvents. (*Chem* 3/1989, p. 37), (*Chem Eng.*, 10/19 17).

N-LINE INFRA-RED PROBE ES A DEBUT IN USA

first full-scale chemical process er employing an infra-red sensor en installed at a Du Pont com- plant by the unit's manufactur- cility at Axiom Analytical Inc. ornia).

probe enables users to collect in ne the mid-infrared spectra of onal groups that control a reaction, ially providing a window into the on. 'For most processes, a system is will pay itself, the first time it nts a batch from going bad'. The is 8 ft. long and 3 1/2 ft. in dia- and its lower end has an internal tarise sending element that dips he process fluid.

e upper end is connected by a of light guides to a Fourier Trans- Infra-red spectrometer. The ope- of the probe is based on the uated total reflection technique n laboratory analysis, which mea- the degree to which a focused red beam is absorbed by the pro- stream.

practice, the system collects and a complete mid-infra red spec- typically once every 30 sec. Stand- ulti-component analysis then plots entrations of each constituents. *m Eng.*, 10/1990, p. 25).

HI GLASS CO. (JAPAN) EILS A NEW MEMBRANE- L ELECTROLYZER

ahi Glass Co. (Tokyo, Japan) gave ls of a new membrane-cell electro- that can directly produce 50 wt % ic soda from brine, at a Global r Alkali Symposium held on Sept. l by the Chlorine Institute at Wash- n DC.

isting membrane systems are limi- about 35 wt % of caustic, because operation above this level produces a stagnant layer of hydrogen on the membrane's surface and decreases the cell's current efficiency.

To prevent this, Asahi adds a proprietary layer to the cathode side of the new membrane FX-50 and mates it with two of its "zero-gap" electrolyzers. Total energy consumption is the same or less than that for 35 wt % output combined with steam evaporation to the 50 wt % product sold on the market. Further, caustic purity is better — only 10 ppm sodium chloride, rather than 15-30 ppm with other systems. Asahi has successfully tested the system at its Kashima plant, and expects to commercialize it in 1991. (*Chem Eng.*, 10/1990, p. 19).

TEXACO UNVEILS PRODUCTION OF SURFACTANTS FROM LIGNIN

Texaco research team reports they have found a way to make suitable surfactants out of lignin, a waste product from pulp and paper manufacture.

Texaco reports that catalytic reduction of lignins with carbon monoxide yields lignin phenols which can then be converted to surfactants by reaction with sulfur trioxide.

These surfactants were effective in lab tests on different models of oil reservoirs.

According to authorities at Texaco, chemical flooding technology could effectively add up to 150,000 M barrels of oil to US oil reserves alone.

Lignin is not only cheap and abundant but is derived from a renewable non-petroleum resource.

They make up a quarter of a tree's weight and some 40,000 Mb is produced annually in USA as a by-product of paper and pulp making. Development

of surfactants from lignin will boost oil production in a big way. This is done by flooding the underground reservoirs of oils with surfactant solutions and pump the resulting emulsion to the surface and thereby get more oil. (*Chem & Ind.*, 10/1/90, p. 589).

IMPROVED METAL MATRIX COMPOSITES PRODUCED UNDER MICROGRAVITY

American researchers at NASA and Mass. Inst. of Technology are trying to make improved metal matrix under microgravity.

If successful the breakthrough could enable aerospace engineers to use less dense materials in aeroengine turbine blades and so reduce the fuel consumption of jets.

The research team has been making samples of nickel aluminide reinforced with ceramic particles of silicon carbide, aluminium oxide and calcia stabilised zirconia.

They have found that in samples prepared under microgravity, the particles are more evenly distributed in the metal and that the composites are significantly harder than similar ones made on earth. They are less dense than the super alloys now used in turbine blades and also resist oxidation better.

It would not be feasible to make turbine blades in space, however, the microstructural lessons learned in microgravity will allow earth-based methods to be developed for making such components out of these novel composites. (*Chem & Eng.*, 10/1/90, p. 588).

ICI UNVEILS A NEW CERAMIC METHOD TO MAKE CERAMIC LESS BRITTLE

Scientists at ICI Advanced Materials (Runcom, UK) have recently unve a simple technique to make cera less brittle and are now looking end-user partners to develop prod

Because the new method is che and faster than conventional techni it will attract interest from the auto bile and non-military aerospace in tries.

Use of ceramics as structural m ials is limited by this brittleness. IC tackled this problem by introdu weak interfaces within the materi deflect any growing cracks.

In the process, patented by ICI icon carbide powder is made into sheets coated with graphite to give interfaces.

The sheets are then pressed tog and sintered without pressure. essential point is that the inte between the sheets is weak enou deflect cracks and thus increas resistance to fractures.

With normal ceramics a crack go straight across a sample an completely.

With these materials the cra deflected when it reaches the inte Tough ceramics are currently pro using a technique called che vapour infiltration.

This complex method can tak eral months, and success is not g teed. ICI claims its new metho produce tough ceramics at almos fiftieth the cost.

Tests with the interfaced m show the fracture toughness 15-times greater than conve eramics.

Moreover, ICI adds, the tec can be used to produce other ce such as zirconia. (*Chem Wk.*, 10 p. 21).

Book Review

O-SELECTIVE CATALYSIS, NHA, PUBLISHER: A.K. A, SINHA TECHNICAL SER- MIDC DOMBIVILI (E), E-421 203, 93 PAGES, (PRICE MENTIONED).

lysis probably offers the great- llenges in chemical engineering ability to offer tailor-made com- be it for fine or commodity als. Numerous laboratories and sities are active in these areas, e National Chemical Laboratory ne probably spearheading the al effort in catalysis.
mmendable work in development roved catalysts for ammonia pro- n has been carried out in some of tiliser and public sector consul- organisations. Catalysis has come ognition in recent times with the Pune winning a recent ICMA for pioneering the ENCILITE s based on indigenously deve- loped zeolite catalysis. Regio-selective catalysis is of vital concern, particularly in the manufacture of a host of starting materials such as p-dichlorobenzene, from chlorobenzene; p-chlorotolune from toluene; p-chlorophenol, 2,4-dichlorophenol and 2,4,6-trichlorophenol all from phenol; p-nitrochlorobenzene from monochlorobenzene etc.

In many such and other products strong demand for one stereo-isomer over others should act as a spur to development of regio-selective catalysis. The book, the first by the author is divided into 15 chapters: Chapters 1-5, cover the topic of chlorination of a number of feedstocks; typically benzene, toluene, acetic acid, phenol and other inorganics such as zinc chloride, copper chloride etc.

Chapter 6 covers catalysts for nitration of organic chemicals and discusses in detail the amounts of various isomers obtained in the nitration of toluene using various catalyst systems. Chapters 7-12, deal with the manufacture of specific chemicals such as dichlone, 2,6-dichloro-4-nitroaniline, 3,4,5-trimethoxybenzaldehyde, 3,4,5-trimethoxybenzoic acid, trimethoprim, and oxalic acid.

Of particular interest is the chapter relating to oxalic acid, the manufacture of which is particularly attractive for a country like India, endowed with a sizeable sugarcane crop, and a well established alcohol-based chemical industry. Chapter 13 covers esterification catalysts and notes that while sulphuric acid appears to be only slightly more than half as effective as hydrochloric acid, it may cause dehydration of alcohol if used in too great an amount or at too high a temperature.

Chapters 14 and 15 cover catalysts for chlorination of nitrobenzene and for manufacture of chloranil respectively. The book is a useful starting point for delving into the literature in this vast field and the author's note that this is the first in a series of books, gives something to look forward to.

PRODUCTION MANAGEMENT

Part-II — Introduction (Continued)

N.R.PAI

Leadership Aspects (Continued)

Providing juniors with healthy environment:

Healthy work climate helps a lot in achieving management goals. Leader has to see that the personnel he recruits are compatible in nature. They should be able to get along with their superiors, peers and subordinates. Otherwise the leader has to spend/waste most of his valuable time in settling disputes, which is certainly detrimental to the growth, working and the very existence of the organisation. Again disputes set in unhealthy atmosphere in the organisation.

Further candidates selected while recruiting should be capable of meeting their job requirements. Otherwise, as has been observed the tendency is to dable with others work unncessarily. It results in a person not working by himself nor allowing others to do their duties. When any employee is able to meet his job requirements well, the chances of his maintaining amicable relations with superiors and subordinates are much enhanced. It reduces organisational friction and steps up employee output. Another aspect of providing healthy employee environment is to provide subordinates with good working conditions which chiefly includes adequate-employee facilities. Leader, now a days is even expected to-take genuine interest in each subordinates personal well-being, if he wants to be a success. He has also to cement well his subordinates. Such an achievement on the part of the leader leads to an excellent team work and an excellent team work means excellent results.

Furnishing creative ideas:

This is the most important duty of the leader. In these days of fast shifting technologies, leader must often come out with novel creative and workable ideas to keep his company floating and fluorishing. An organisation devoid of creative ideas cannot expect itself to be in the forefront of the industrial world. Novel ideas are the outcome of creative thinking which in its turn is an outcome of inspiration coupled with applied intelligence.

A leader with creative thinking is expected to be dissatisfied with everything that is existing in his organisaion. He must just be out to explore the possibilities of creating better and cheaper products more efficent and effective procedures of working, shortening time of manufacture and employing cheaper and indigenous raw materials in place of imported ones, wherever possible. And all this must be done without affecting the final quality of the end product/s. In big industrial houses this job idea production is often assigned to Research and Development wing of an organisation, which is staffed with well-qualified and experienced research personnel. Even then, the final resposibility of producing novel ideas lies with the leader. He cannot evade it.

Generally any creative thinker starts his job by going through all that is existing and known, about the products, processes, methods etc. He accumulates facts and weighs them against cost. He then applies logical reasoning to arrive at better/-cheaper product, more efficient less costly methods etc. Many mental faculties are involved in the process of innovation which definitely includes mental speculation, logical reasoning, creative imagination and last but not the least intitution too. It is said more one thinks of a problem in all its aspects from all its angles more and more ideas pour into one's mind. To solve a problem, one has to get identified with it. Human mind is always capable of producing new ideas, only one has to train it to arrive at logical conclusions.

After creating and arriving at a new idea the first thing a leader has to do is to convince all the organisational concerned persons about its implementation. This includes his superior (if any), peers as also the subordinates. In other words he "sells" his ideas to the other concerned personnel of his organisation.

It has been observed that man is averse to a change and the resistance to the change is often met with from old employees who generally feel "all that they have been doing so far is perfectly o.k. and that there is no need of any change whatsoever". The best way to get them around is to show them in terms of concrete figures "how much the company will benefit by implementing the new idea". That's the best way to convince, since it is very difficult to go against figures. This winning over is necessary because their whole-hearted cooperation is needed in implementing new ideas.

After the organisational personnel are won over, the next role is to convince wholesalers, retailers and through them finally the consumer himself. This is also achieved by advertising through different media, emphasising thereat, the advantages of the new product over the existing one of its kind.

This task of creating new ideas and then getting "O.K.," for them is the chief duty of a top executive. It is this aspect which keeps the organisation above its competitors. The leader should therefore be always on a look out for new ideas, novel procedures, cheaper and better substitutes for existing products and more efficent services to the customer.

To-day any industrialist for that matter, faces challenges from the world, especially from his competitors, and that too, all the time. If he fails to meet them successfully, his firm stands no future in this competitive era. On the contrary, if he comes out with workable new creative ideas every now and then, his will be a growing firm, ahead of his competitors, with respect to time, progressing dynamically with full life in it.

Enhancing subordinate capabilites

This is also known as personnel development. It aims at stepping up the capabilities of organisational personnel to the highest possible extent. When employees working in an organisation, fully develop their abilities, they as well as the organisation are benefitted.

In authority delegation, routine work of superiors is entrusted to the subordinates. They then get well acquainted with these tasks in course of time and also get involved in the connected decision making process. They are thus slowly developed to take up responsibilities of their superiors, thereby rendering internal promotions in an organisation meaningful and effective.

The principal aims of executive development can be enlisted as follows:

(a) Enhancing performance of the regular jobs assigned to them.

(b) Taking up in addition to (a) above, routine tasks of the superiors, thereby setting the bosses free to look after more important executive tasks. The bosses in their turn can then take up the routine tasks of their superiors. This is called ''job enlargement'' in management terms.

(c) Job enlargement as cited above renders an executive fit for promotion to his superior's post. This makes the promotion within an organisation truly feasible, thereby giving employees enough opportunities to rise in an organisation. This policy on the part of a firm, reduces personnel turnover of the company to a bare minimum. When there are sufficent chances to rise, hardly anybody thinks in terms of a change in job. On the same lines leader achieves the goal of developing supervisory personnel. Their performance of jobs at hand is improved and by way of job enlargement their capabilite are raised. This naturally makes them (superiors) worthy of promotion to the junior management cadre.

Here there is one point to note. Supervisory cadre forms an important link between management staff and workers, and keeping this cadre happy is conducive to the working and growth of an organisation. In fact, supervisors represent workers to the management and management while dealing with workers. Most of the workers' disputes can be solved with the help of this cadre. Even the workers cadre can be developed this way. The aims here are to step up individual output, to improve upon the quality of the product they he in producing, to develop better their sense of safety towar work at hand, to generate cost consciousness amongst the (workers), to make them knowledgeable about aims, goa and policies adopted by the company (they are then in a bet position to understand the companies moves and may not carried away by the outside forces easily) and finally to mal them worthy of promotion to the supervisory cadre as ar when the openings arise.

Administrative aspects:

This covers the following points;

Programming and decision making:

This point in its turn includes:

(a) Deciding about organisational aims and goals

(b) Chalking out methods and procedures to attain these goals

(c) Laying down standards of performance and of costs t evaluate operational success.

Recruiting, staffing and organising:

Success of an organisation largely depends upon the abil ites and attitudes of persons who serve it. Hence for the chie executive it is his skill of selecting right type of personne which decides his fate and that of his organisation. The per sonnel selected should be such that they vitalize the organ isational structure. Qualifications, experience and abilities o individuals must tally well with their predetermined job requirements.

Subordinates at each rung of the management ladder must be clearly and precisely told about their authority at work and the corresponding responsibilites they have to shoulder.

Their areas of working and that of responsibilites should be absolutely well defined. There should be no overshadow- ing of authority and responsibility from any other individ- ual, nor there should be any area which can be looked upon as ''no man's land'' for which nobody is responsible.

Lastly, the important aspect of organising is to provide sufficient opportunities to one's employees for promotion within the organisation. This point has already been discussed under ''job enlargement''. It reduces personnel turn over. It is worth noting that when an experienced person leaves a firm, along with loss of a good person the time and money spent in his training is lost. Again, a new person has to be recruited and trained up which incurs additional cost. Further no body knows how long this ''new person'' would stick on to the job after getting trained. Then there are further losses. Some other company perhaps that of the competitors may pick up such a trained person to their advantage. If this process keeps on repeating often, the original company becomes something like a training center. There are service bonds no doubt, but hardly they stand in the court of law. They then have only

harassement value''. From all these angles it is therefore nportant to bring down personel turn over if it cannot be tally prevented and offering employees sufficient opportnities to rise within the company which is the best solution nown to-day. Employees rise should be in accordance with e rise of the organisation. It is then that they develop faith the fair play of the company which in turn greatly affects eir stability and fidelity towards the firm.

ctivating

It involves arousing the work force for actions. Actions at are chalked out to achieve organisational goals. It thus cludes:

) Issuing of orders to the juniors and instructing them clearly ow to carry out planned activities. Orders can be oral or writing.

) Close supervision to achieve perfect coordination of subrdinates, efforts in achieving company objectives.

xercising control:

Control is a mangerial task intended to achieve planned utcome against utilisation of alloted resources. It has several points which come in quick succession. They can be nlisted as follows:

a) Deciding about basic standards of expected results against esources planned to be used.
b) Measuring meticulously actual results obtained.
c) Comparing actual results against planned ones.
d) Ascertaining deviators in ''results obtained'' from ''results xpected .
e) Earmarking meaningful deviations.
f) Finding out their causes.
g) Implementing immediate remedial measures, so that the ext reporting period does not indicate adverse results owing o the identical causes.

ersonnel fabrication of an organisation:

There is no common standard that is followed in all or even most of the companies to design the ladder of personnel rrangement. It differs from organisation to organisation and a great extent it depends upon the size of the firm, products it manufacture and processes it adopts. Nevertheless, n average sized manufacturing firm often goes in for the llowing five personnel cadres:

1) Top executive (2) Senior executive (3) Junior executive 4) Supervisory class and (5) Class of operators and workers.

amifications of production activity:

That way production activity is noticed in almost every ype of business; only what differs is its degree. Thus it is oticed in the field of agriculture, that of mining and of civil onstruction and fisheries. However, it is the manufacturing industries which are mainly and directly concerned with the management of production activity.

It thus takes us to ''what is manufacturing''. In manufacturing activity raw material/s forms is changed. It generally involves carrying out of several operations in quick succession with or without the aid of machines. During this act of processing raw materials and semifinshed goods are moved from place to place.

Broadly speaking manufacturing processes can be considered under five heads:

(a) Manufacturing by raw material split up.
(b) Manufacturing by synthetic processing
(c) Manufacturing by way of assembling
(d) Manufacturing by extraction processes
(e) Manufacturing by modifications.

Splitting up processes:

Here raw material is broken down, fractionated or split up to obtain the final useful products. Examples cited are those of destructive distillation of coal and refining of crude petroleum oil as obtained from oil wells.

In the first case, coal is thermally broken down in the absence of air to yield coal gas, coke, ammonia liquor, coal tar etc. Each of these ingredients has its own field of utility.

The last named coal tar for example is further fractionated to give various aromatic chemicals like benzene, toluene, napthalene etc. They form the basic raw materials for several chemical industries. Similarly refining of petroleum crude gives combustible gas (L.P.G.) used as household fuel, kerosene for stoves, gasoline for aircrafts and automobiles, diesel oil for heavy vehicles, solvent naphtha for chemical industry and asphalt for road construction.

Synthetic processes:

In synthetic processing the raw material is converted into useful finished goods by condensing, i.e. by binding or joining together smaller chemical units. Synthetic dye or a sophisticated synthetic medicine is made this way.

Manufacturing by assembling:

This class is exemplified by automobile, aeronautical television or radio industry. Here different components parts are made first and are then assembled to size to give the final useful product.

Manufacturing by extraction:

Examples are extraction of metals from their ores and extractions of medicines (quinine for example) from botanical sources.

Manufacturing by modification:

Here original raw material is modified to get final useful product. Iron ingots can be casted into moulds after melting. The product obtained on cooling is smoothened at its edges and surfaces and is brought to proper shape and design by machinery.

Production function:

As stated earlier production involves or amounts to conversion of raw materials into the finished goods of utility. Many products can be manufactured by different methods and by starting from different raw materials but they cannot be always made into a commercial success e.g. though sea water contains gold we cannot extract it at a competitive price. Since apart from bulk handling involved, its percentage content is very low and hence such an extraction can never be economical.

It is therefore futile to make a product by any route which cannot stand competition in the market since it hasn't got economical sanction. Hence production has to follow the correct route starting from competitively priced raw materials. Even after achieving both these points, production cannot b a success unless right amount of final product output (agains known input), of right quality is obtained in the shortest pos sible time limit. And it is here that the management aspec comes into play.

Production activity therefore has to be successfully man aged in such a way that starting from the cheaper possibl raw materials and following the least expensive route, manu facturing of the finished goods of utility is achieved in th right quality, in the right quantity and in the shortest spec ified time limit. Production manager can then be looked upo as a person at whose disposal are men, materials an machines. He has to make them productive. Materials ar handled by machines and machines in turn are operated b human element. The latter two symbolise energies. Produc tion manager has therefore to channelise these available ener gies to achieve the preplanned profitable goal. Productio management can then also be looked upon as a functio involved in channelising available energies, whether thei source is found in machines or in humans, to attain the desire organisational objectives.

Dyestuff and Dye Intermediates: Industrial & Export Opportunities*

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One cannot imagine a world without colour. Even the prehistoric man must have been so enchanted with the vibrant colours of the sky above, the oceans below and the fauna and flora around, spreading a shimmering array of colours, that the first strains of music might have originated from his throat, as a paeon in praise of colour! Colour from time immemorial has been adding zest to life.

In the earlier days, before the advent of the synthetic organic dyes, colours from naturally occuring substances have long been in use on textile. The use of indigo, alizarine, tyrian purple and the like are well known.

Origin of the synthetic dyes manufacture

The synthetic organic dyes and pigments industry had its origin in the year 1856, when Willian H. Perkin, in his attempts to seek a synthetic route to quinine, accidentally discovered the purple dye mauvine. Discovery of a number of other dyes followed in quick succession in the laboratories of Europe. Some of the largest chemical manufacturers of today, started as the developers and manufacturers of colours in the early part of the century. Many of the path breaking discoveries in the organic chemical industry, owe their development, to the knowledge gained from the synthesis of colours.

Although it was Perkin, who discovered the first synthetic organic dye mauvine in England, the subsequent developments were not dominated by England but, by the European manufacturers. Germany, France and Switzerland in quick succession followed with the development of an array of colours. The American dyestuff industry followed this and by the end of the second World War, they were one of the largest producers of synthetic dyes. The period from the 1930s until the seventies was one of development, growth and stability, contributing to a number of other products developed in the chemical industry, until the first oil price shock, shook the very foundations of this industry in the seventies. Today, the dyestuff manufacturing industry which is capital and labour intensive, by its very nature, being a batch process manufacture, is at cross roads in the developed economies.

Perspective of the industry

The estimation of the global output of synthetic organic dyes and pigments could at best be a guesswork, as no authentic figures are available. However, from available data one could put together a figure of 800,000 metric tonnes. This could be further broken into countrywise production figures as below:

West Germany	1,80,000 tons
USA	1,20,000 tons
Switzerland	65,000 tons
France	35,000 tons
Japan	60,000 tons
U.K.	50,000 tons
Eastern Europe including USSR	1,40,000 tons
Western Europe (others)	10,000 tons
Taiwan	10,000 tons
Korea	15,000 tons
South American countries	10,000 tons
India	35,000 tons
Thailand, Indonesia and others	10,000 tons
China	60,000 tons
	8,00,000 tons

The total global manufacture of different classes of dyestuffs may be divided as below:

Share of major classes of dyes in the global output

Sulphur dyes	18.0%
Directs	17.0%
Acid	16.0%
Disperse	16.5%
Vats	12.0%
Reactives	6.0%
Azoics	6.0%
Basic	4.5%
Pigments	4.0%

(Ref. Textile Dyer & Printer, Dec. 31, 1986, pp. 20/21.)

Now having looked at the manufacturing industry, an assessment of the major end user industry is important and some figures that are available are presented below:

World textile consumption*

In million tons

(1)	1986 (2)	1995 (3)	2000 (4)	% growth rate (5)
All fibres	36	45.5	52	2.6

* Paper presented by the author at the International Conference on Chem-

(1)	(2)	(3)	(4)	(5)
Cellulosic	17	20.7	23	2.2
Blended fabrics	4.4	7.0	9	5.3

(* from JSDC Vol. 105 - Dec. '89)

With this background if one were to look at the use of various classes of dyes, the figures are as furnished below:

Dyes used in cellulosic fabrics

Class	1973	1979	1988	Growth Future
Direct	75,000	74,000	74,000	Stable
Sulphur	1,08,000	1,00,000	90,000	Declining
Azoics	29,000	20,000	26,000	"
Vats	48,000	47,000	36,000	"
	2,60,000	2,50,000	2,28,000	Declining
Reactives	23,000	42,000	60,000	4% projected
Total	2,83,000	2,92,000	2,88,000	
Indigo	7,000	9,500	12,000	
	2,90,000	3,01,500	3,00,000	

(Ref. JSDC p. 426, Dec. '89)

The figures furnished would show that the European manufacturers produce about 45% of the world output, the Japanese about 9 per cent, the USA about 17.5% and other parts of the world the rest.

Figures of production from China are not available and no amount of guess estimate can lead us anywhere. The fact however remains that the Chinese factories produce a substantial volume of dyestuff and dye intermediates as may be estimated from the quantities that come into various markets and extrapolating these volumes, one can assume a certain volume of production.

The American industry imports, according to data available, an estimated 35 per cent of their total requirement. It is reported that the U.S. consumes approximately 14 per cent of the world output of textiles, and by extrapolating this figure and working out the total use of dyes, one could hazard a figure of imports of 30,000 tons of dyes per annum, in the U.S.A. alone.

Dyestuffs and intermediates
Industry profile

1. Installed capacity 1988-89
   - Organised sector : 36,800 TPA
   - SSI sector : N.A.
2. Production 1987-88
   - Organised sector : 29,051 tonnes
   - SSI sector : N.A.
3. New capacity approved for organised sector during 1988-89 : 4,814 TPA
4. Domestic demand project
   - 1989-90 : 40,065 TPA
   - 1994-95 : 49,980 TPA
   - 1999-2000 : 61,100 TPA
5. Licensing policy : Compulsory licensing
6. Minimum economic size : Not fixed
7. Broad banding : Press note No. 19 (1988 series) of Ministry of Industry No. 10/25/88 LP dated 19.8.1988.
8. Exports 1990 : Rs. 5,000 million approximately
9. Imports 1987-88 : N.A.
10. Export potential :

	1989-90	1994-95	1999-2000
			TPA
Dyestuffs	8000	11000	13000
Intermediates	10000	13000	16000

(Source - Perspective Plan - Govt. of India)

The Indian scene

Now let us turn to the Indian scene and look at the development of the industry in the last four to five decades. While the origin of the synthetic organic dyestuff and pigment industry can be traced to the year 1856 when William H Perkin synthesised mauvine, it is nearly nine decades later that the **Indian** synthetic organic dyes industry had its beginning.

Considerable work had been done in the U.K. and Western Europe during these nine decades. In India a beginning was made when in the year 1940, M/s. Associated Research Laboratories made efforts to manufacture rapid fast dyes, as the Indian textile industry was facing an acute scarcity of dyes with the onset of the second World War.

In the year 1941, the Government of India set up a Dyestuff Exploratory Committee which submitted a comprehensive report in 1945 emphasising the importance of the dyestuff industry to the national economy and the need for establishment of the manufacturing facility. A Five Year Plan for the phased manufacture of dyes and some dye intermediates was drawn up.

In line with this recommendation and as a contribution to e national economy by substituting the import of a vital ommodity, the Lalbhai group of Ahmedabad, established a anufacturing facility near Valsad, in the West Coast of In-a, under the name and title, ATUL PRODUCTS LTD. with e objective to manufacture azoic dyes, sulphur black etc. collaboration with the Calco Division of the American yanamid Company. In the next five years a number of other puted houses set up similar industries for the manufacture f dyestuffs and their intermediates. The rest is history.

The statistical data available for the earliest period of the ndian dyes industry records the details of imports as per nnexure-1 for the period 1965 to 1968. For the same period etails of exports of dyes are as per annexure-2. In the year 964, as per data available, the total installed capacity of the rganised sector of the Indian dyes manufacturing industry, as 11,170 tonnes and this increased to 15,391 tonnes in 1967 nd 21,566 in 1975, which at present stands around 36,000 ons. The details are as per annexure-3. The Indian manu-acturing industry has two sectors viz. large scale (organised) nd a small scale sector, categorised by investment limits and xclusive reservation of products.

While figures are available for the production in the orga-ised sector, no reliable data is available for production in mall scale sector, which has had a phenominal growth in the ast twenty years. There are 48 units today in the organised ector and about 900 units in the small scale sector. On a ough estimation the production in the small scale sector, can e placed around 10,000 tons, comprising largely of directs, cids, mordant and reactives. The total output of the dyestuff ndustry alone, in terms of value, may be placed at around Rs. 10 crores. The industry is reported to employ 35,000 persons.

Trends of consuming industry in India

According to the data compiled from the report of the sub group on synthetic fibres — (Committee for Perspective Planning of Petrochemical Industries 1986-2000) some figures are available. These forecast the demand projection as per annexure 4. In India textile production is largely under three sectors:

Production of cloth in three sectors (in million metres)

	1980-81	1981-82	1985-86	1986-87
Mills (organised)	4168	3808	3376	3303
Powerloom	4140	4547	5886	6149
Handloom	2680	2626	3236	3325
	10988	10981	12498	12777

Estimated forecast of likely production figures of cellulosics and non-cellulosics (in million metres)

	Cotton	Non-cotton	Blends	Total
Mill sector	3050	50/60	1400	4500
Powerloom	2200	2986	214	5400
Handloom	3500	300	800	4600
	8750	3336	2414	14500

The total yarn production during 1986-87 is reported to have been around 1560 million kgs which is a 100 million kg higher than the year 1985-86. This is well over the Seventh Plan target of 1542 million kg of all types of yarns to be achieved by 1990. In the same period, the cloth production has grown from 1250 million metres to 1300 million metres. The target for the Seventh Plan is 1450 million metres and this is likely to be achieved in the light of the growth rate presently recorded. Out of this target of 1450 million metres in the Seventh Plan, 4500 million metres are expected to come out of the organised sector, almost the same quantity from the handloom industry and the rest from the powerloom sector. As against this, the Sixth Plan target was 12000 million metres, comprising 4900 million metres from the organised sector, 4000 million metres from the powerloom sector and 3100 million metres from the handloom sector. The per capita availability of cloth in the Seventh Plan is estimated to reach 17.5 metres.

The synthetic fibre production during the year 1985 has been as below:

Acrylic fibre	21000 tons
Nylon filament yarn	33000 tons
Nylon industrial yarn tyre cord	20000 tons
Polyester staple fibre	39000 tons
Polyester filament yarn	56000 tons

The estimated production of synthetic fibre in the year 1990 is given below:

Polyester staple	212000 tons
Polyester filament	117000 tons
Nylon filament	91000 tons
Acrylic fibre	100000 tons

Based on the various figures thus available, the projection of future trends and the pattern of consumption, the demand projection for the Eighth Plan period may be considered accordingly.

Paper industry

According to data that can be put together, the paper industry which was turning out a total volume of 1.50 million tons

in 1985, is poised to reach a capacity of 4 million tons by the year 2000, as per plan estimates.

Leather industry

Data available on the projection of leather production, estimates a production of 173 MTO-sqm. by the year 2000. The exports of leather and leather goods are expected to reach great heights, by the year 2000, depending upon availability of inputs for the industry. A rough estimation would put the requirement of dyestuff by the leather industry at about 1000/1100 tons per annum.

Given this background it may be observed that the domestic production of dyestuff has almost to be doubled to meet the demand of the various end using industries. The current production of dyestuff in India would hardly account for 4% of the world output and with the opportunities available in the domestic market and the international market, as well, the industry has tremendous potential growth. Based on these data the domestic demand for dyestuffs for 1990, 1995 and 2000 may be estimated as per annexure 5. The per capita consumption of dyes which is around 40 gms today is expected to increase to 62 gms by the year 2000 AD.

Exports

It is a well known fact that the manufacture of dyestuff, by the very nature of the chemistry, is a batch process and highly capital and labour intensive. Besides, the strict environmental protection regulations and effluent disposal limits, have imposed heavy burden of cost on the industry. The developed countries may not therefore be keen to increase investments and expand, in this industry and this might provide a good opportunity to the Indian dyes industry.

Further, in the developed economies, with the rapid changes in fashions and the need to change manufacturing plans to suit these demands forecasting techniques have to be absolutely accurate if one is to avoid being saddled with inventories. This again places the Indian dyes industry in an advantageous position. The latest figure of exports of dyes and dye intermediates available for the period April 1989 to February 1990, shows exports of about Rs. 5,000 million compared to the exports of Rs. 45.49 million in the year 1985-86, this is indeed a spectacular achievement, but considering the opportunities available this is negligible.

Export potential

The statement, as per annexure-7 shows the estimated export potential for dyestuff and intermediates.

But, then, what is holding up the prospects of the industry in India

The high cost Indian economy, compounded by a high ICOR ratio is one of the most important reasons for the slow growth of the industry. Besides, the high administered pric of raw material, supplies of which are mostly controlled the public sector organisations, high financing costs, sc city of resources, lack of infrastructural facilities, time co suming procedural problems, are some of the reasons for t incompetitive status of the industry. The need of the ho is high productivity, availability of inputs at comparable int national levels, liberalised regulations and fast clearance procedural requirements and above all a proper investme climate.

Recognising these needs and requirements, our Gover ment has initiated a number of measures to strengthen t industry. Some of these measures like the simplification procedures, making available vital inputs at internation prices, special low rate of duty on imports of capital good lowering of interest rates etc. should go a long way in impro ing the prospects of the industry. The latest industrial polic announced by the government, indeed augurs well for growth oriented industrial environment.

Combined with this and with improvements in product vity, technology upgradation in the context of internation developments, to reach comparable levels, proper training man-power, innovations in energy economy, improveme of safety standards and more efficient effluent disposal sy tems etc., India will be an ideal base, for the growth of t dyestuff and dye intermediates industry, to take advanta of the tremendous opportunities available in the internation markets. The Committee, which has drawn up the perspe tive plan for the industry, has prepared detailed estimates the basic building blocks and intermediates that would b required to meet the growing demands of dyestuffs, both fo the domestic and international markets. These are presente in annexure 6.

Basic building blocks and dye intermediates

Most of the primaries and their derivatives as well as anci lary chemicals are available in the country. Most of the inte mediates are manufactured in the organised and small scal sectors. More than 400 intermediate products are require for the manufacture of dyestuff and most of these are toda made in the country.

Where do we go from here

Thus far, I have attempted to present a brief but factua presentation of the origin, growth and development of th colouration industry with particular relevance to India. Now looking to the future, one finds an immense oportunity to b exploited. India has a very large reservoir of scientists an technologists and the industry has come of age and the pro ducts manufactured have found acceptance in some of th countries where from the product originated. Some of the pro cesses coming out of our National Laboratories have resulte

the introduction of several new chemical synthesis, One nnot ask for better. Thus, there is an industry at a mature vel of development, with a vast technical and infrastructral base, raring to go to find a place in the Sun. There is Government machinery willing, and keen, to support, with peral policies. There is no doubt that the industry is bound achieve great heights in the years to come. The opportunies are beckoning those who wish to take advantage.

Annexure 1

(1)	Qty. kg (2)	Qty. kg (3)	Qty. kg (4)
irect dyes	1,16,110	86,954	40,578
cid dyes	1,71,712	99,792	84,277
asic dyes	1,54,728	85,534	50,171
lordant dyes	10,862	16,569	12,840
aphthols	18,818	32,238	20,367
ast colour salts	-	-	-
apid fast & rapidogens	12,711	14,721	6,798
ast colour bases	74,034	58,276	78,050
at dyes	5,05,056	3,34,870	3,62,344
olubilised vats	10,523	5,608	1,902
ulphur dyes	47,958	48,976	36,304
rganic pigments	64,092	76,541	48,253
igment printing emulsions	20,934	2,224	10,717
eactive dyes	82,391	59,294	51,592
ptical whitening agents	14,023	17,731	27,861
isperse dyes	1,34,578	97,035	79,955
ngrain dyes	12,162	5,474	7,792
Miscellaneous	15,861	13,783	12,703
Total	14,66,533	10,55,614	9,28,504

Annexure 2

	Qty. kg	Qty. kg	Qty. kg
Direct dyes	17,653	11,750	12,658
Acid dyes	59,396	38,361	41,097
Basic dyes	18,981	8,286	16,019
Mordant dyes	836	-	-
Naphthols	16,754	8,694	17,728
Fast colour salts	40	-	-
Rapid fast and rapidogens	-	-	-
Fast colour bases	10,832	5,343	13,039
Vat dyes	41,521	24,946	16,666
Solubilised vats	-	520	-
Sulphur dyes	37,160	34,550	26,250
Organic pigments	60,290	-	2,801
Pigment emulsions	-	-	-
Reactive dyes	30	-	-
Optical whitening agents	65,488	89,483	42,723
Disperse dyes	25,555	2,480	13,044
Ingrain dyes	10,000	502	9
Miscellaneous	30,848	21,175	23,017
Total	395,384	246,090	213,399

Annexure 3

yestuff group	Production (tonnes)			
	1967	1979-80	1984-85	1986-87
crylic fibre dyes	-	10	-	6
zo, acid & direct dyes	2364	3410	2399	2478*
asic dyes	280	946	51	73
isperse dyes	13	895	1486	1977*
ast colour bases	654	1134	716	535
ood dyes	-	65	44	46
ngrain dyes	28	215	166	137
aphthols	936	1748	1165	922
il and spirit sol. dyes	-	38	29	56
ptical brighteners	590	1105	635	909
rganic pigments (including pigment emulsion)	1375	5352	6159	5901
eactive dyes	147	1962	2110	2542
olubilised vat dyes	88	103	52	150*
tabilised azoics	-	85	52	26
ulphur dyes	1453	1545	1584	1500
at dyes (including indigoids)	1782	1631	1764	1749
lordant dyes	35	-	-	-
apid fast and rapidogens	626	-	-	-
ast colour salts	149	-	-	-
iscellaneous dyes	273	-	-	-
Total	11606	20244	18412	19007

Annexure 4
Textile demand estimates
(million metres)

	1989-90	1994-95	1999-2000
Planning Commission	14500 + Khadi & Hosiery = 16177	-	21600 + Khadi & Hosiery
Textile Committee	16958	20504	25250
Working group on textiles	15150	-	-
Sub-groups' estimates			
Eco. model-1	15370	18616	22733
Eco. model-2	16547	20261	24928
Eco. model-3 (PCE)	15853	19755	25687
Cotton price equiv. model	15681	18885	22599

Total man-mades
Sub-group models ('000 tonnes)

Model	1989-90	1994-95	1999-2000
Economic model-1	420	595	833
Economic model-2	595	852	1195
Economic model-3 (PCE)	560	767	999
Cotton price equiv. model	550	737	962
Dev. countries model	567	826/916	1123/1316
The sub-groups' best estimates	550	750	1000

Developing countries model only estimates man-mades. (Synthetics + 1,50,000 tons of cellulosics)

Estimated fibre mix
('000 tonnes)

	1990	1995	2000
Total man-made	550	750	1000
Cellulosics	150	150	150
Nylon (20%)	80	120	170
Acrylic (15%)	60	90	130
Polyester (65%)	260	390	550
PEY 60/50	130-156	195-234	275-330
PFY 40/50	104-130	156-195	220-275
Nylon tyre cord	40	50	61
Nylon industrial	6	18	35

The sub-group also compared these estimates with the esti- n ates made by others. The details are given in table alongside:

Textile fibre demand 1989-90
('000 tonne

Groups	ASF	PSF	PFY	NFY
Working group on petrochemicals	NW	210	90	90
7th Five Year Plan	30	100/111	77/78	56/70
Working groups on textiles	NW	212	117	91
The sub-groups' estimates	60	104/130	130/156	80

NW = Not worked out.

Annexure 5

Class of dyes	1989-90	1994-95	1999-2000
	(TPA)	(TPA)	(TPA)
Acrylic fibres dyes	335	540	800
Azo, acids and direct dyes	8480	9350	10000
Basic dyes	1700	1925	2100
Disperse dyes	5375	8675	12750
Fast colour bases	2770	3150	3500
Food dyes	120	120	120
Ingrain dyes	335	370	400
Naphthols	3650	4150	4650
Oil & spirit soluble dyes	300	400	500
Optical brighteners	2570	3280	4100
Organic pigments (including pigment emulsion)	4425	5650	7200
Reactive dyes	4650	5660	6850
Solubilised vat dyes	150	170	190
Stabilised azoics	200	200	200
Sulphur dyes	3325	4450	5650
Vat dyes (including indigoids)	1680	1900	2150
Total	40065	49980	61100

Annexure 6
Demand projections for major intermediates
(Tonnes)

Intermediates (1)	1989-90 (2)	1994-95 (3)	'99-2000 (4)
Acetanilide	1400	1790	220
Acetoacetanilide	476	609	74
Acetoacet-o-anisidine	20	26	3
Acetoacet-o-chloroanilide	59	76	9

	(2)	(3)	(4)
toacet-o-toluidide	19	24	30
toacet-m-xylidine	83	10	130
Acetyl-o-toluidine	341	436	530
Aminoacetanilide sulphonic acid	34	44	55
Aminoanthraquinone	565	735	852
Aminoanthraquinone	11130	1469	1704
Amino-5-benzoylamino-anthraquinone	30	39	45
Amino-2-bromo-4-hydroxy-anthraquinone	150	195	226
Aminoanthraquinone-2-carboxylic acid	86	112	130
Amino-5-chloroanthra-quinone	172	224	260
Amino-2,4-dibromoanthra-quinone	194	252	292
Amino-3-hydroxyanthra-quinone	62	81	94
nino iso-G-acid	414	530	650
Amino-2-methoxy-4(p-tosyl-amino)-anthraquinone	32	42	49
Amino-4-nitroanthraquinone -2-carboxylic acid	76	99	115
Amino-4-nitrophenol	49	63	80
Amino-4-(p-tosylamino) anthraquinone-2-sulphonic acid	44	57	66
nilinesulphonic acid	59	76	90
nthraquinone	5010	6513	7555
nthraquinone-1:5-disulphonic acid	650	845	980
nthraquinone-1:8-disulphonic acid	182	237	275
nthraquinone-2:6-disulphonic acid	95	124	144
nthraquinone-1-sulphonic acid	925	1200	1392
nthraquinone-2-sulphonic acid		2193	254
-(Anthraquinone-1-yl-amino)-benzanthrone	56		85
B-acid	55	70	85
B-acid	242	310	380
enzanthrone	1170	1521	1764
-Benzoylamino-5-chloro-anthraquinone	231	300	348
enzoyl J-acid	12	14	20
enzoyl-o-benzoic acid	5628	7316	8487
eta-naphthol	6700	8575	10500
etaoxynaphthoic acid (BON acid)	2150	2450	2800
:9-Bis-(anthraquinon-1-yl-amino)-benzanthrone	90	97	114
:4'-Bis-(benzoylamino)-1:1'-dianthrimide	143	186	216

(1)	(2)	(3)	(4)
4:5'-Bis-(benzoylamino)-1:1'-dianthrimide	181	235	273
5:5'-Bis-(benzoylamino)-1:1'-dianthrimide	48	62	72
Bromamine acid	240	312	362
3-Bromobenzanthrone	312	406	471
2-Bromo-3-hydroxyanthra-quinone	42	55	64
Chicago acid	338	433	530
Chloroaminophenol-4-sul-phonic acid	58	74	90
1-Chloroanthraquinone	232	302	350
1-Chloro-2-methylanthra-quinone	38	49	57
4-Chloro-2-nitroanisole	325	416	505
Chloronitrophenol-4-sulphonic acid	92	118	145
CLT acid	342	438	535
1:4-Diaminoanthraquinone leuco	254	330	383
2:6-Diaminoanthraquinone	44	57	66
4:4'-Diamino-1:1'-dianthrimide	133	173	201
4:4'-Diaminostilbene-2:2'-disulphonic acid	1128	1445	1800
1:4-Diamino-2:3-dichloro-anthraquinone	98	127	147
1:4-Diamino-2:3-dicyano-anthraquinone	40	52	60
Diaminodihydroxyanthra-quinone	160	208	241
Diaminodinitroanthraquinone-disulphonic acid	141	183	212
1:4-Diaminoanthraquinone-2-sulphonic acid	30	39	45
1:1'-Dianthrimide	128	166	193
Dibenzanthrone	120	156	181
4:4'-Dibenzanthronyl	320	416	483
4:5'-Dibenzoylamino-1:1'-dianthrimide	136	177	205
3:9-Dibromobenzanthrone	73	95	110
1:3-Dibromo-2-hydroxyanthra-quinone	62	81	94
1:5-Dichloroanthraquinone	369	480	557
3:3-Dichlorobenzidine	445	570	700
2:5-Dichloronitrobenzene	304	389	475
2:5-Diethoxyaniline	42	50	60
1:5-Dihydroxyanthraquinone	149	194	225
1:8-Dihydroxyanthraquinone	108	140	162
16:17-Dihydroxydibenz-anthrone	713	927	1075
Dihydroxydinitroanthraqui--none	140	182	211
Dihydroxydinitroanthra-quinone-disulphonic acid	256	333	386
2:5-Dimethoxyaniline	50	65	80

(1)	(2)	(3)	(4)
Dinitroanisole	1010	1292	1600
2:4-Dinitrochlorobenzene	2000	2550	3100
4:4'-Dinitro-1:1'-dianthrimide	110	143	166
Dinitrostilbenedisulphonic acid	1246	1600	1950
Diphenoxyanthraquinone	85	111	129
2:8-Diphenylanthraquinone-1-(s):2'(s):6-dithiazole	66	86	100
G-salt	900	1150	1400
Gamma acid	2100	2700	3300
H-acid	5500	7050	8600
Halogenated nitroanilines	740	962	1116
Indanthrone	563	732	849
Isodibenzanthrone	155	202	234
J-acid	418	535	650
J-acid-N-methyl	160	205	250
Laurent's acid	90	115	140
Meta dinitrobenzene	670	860	1050
Metanilic acid	1170	1500	1850
Meta nitroaniline	235	300	370
Meta nitrobenzenesulphonic acid	391	500	610
Meta nitrochlorobenzene	422	540	660
Meta nitro-para-toluidine	276	350	425
Meta phenylenediamine	158	202	250
Meta xylidine-ortho-sulphonic acid	65	7	90
4-Methyl-ortho-benzoyl-benzoic acid	235	306	355
2-Methyl-1-nitroanthraquinone	104	135	157
Monoazoanilines	65	85	99
Naphthionic acid	250	333	405
Naphtol AS-D	92	118	145
Naphthol AS-E	215	275	335
Naphthylaminesulphonic acid	438	561	685
Nitroacetyl-para-anisidine	460	589	720
Nitroaminophenol	68	87	105
Nitroaminostilbene sulphonic acid	148	189	230
1-Nitroanthraquinone-2-carboxylic acid	97	126	146
2-Nitro-4-chlorotoluene	103	132	160
3-Nitro-para-cresol	95	122	150
Nitro-para-toluidine	274	351	430
Ortho-anisidine	670	850	1050
Ortho-chloroaniline	60	77	95
Ortho-chloro-para-nitroaniline	151	193	235
Ortho-nitroanisole	949	1215	1500
Ortho-nitrochlorobenzene	3800	4900	6000
Ortho-nitrotoluene	2365	3030	3700
Ortho-tolidine	376	481	590
Ortho toluidine	950	1210	1500
Oxy-tobias acid	863	1100	1350
Para-aminoacetanilide	59	76	90
Para-anisidine	283	362	440
Para-chloroaniline	124	159	
Para-chloro-ortho-nitroaniline	140	179	
Para-cresidine	100	128	
Para-dichloronitrobenzene	737	934	
Para-nitroacetanilide	42	54	
Para-nitroaniline	320	410	
Para-nitroanisole	307	395	
Para-nitrochlorobenzene	7500	9600	11
Para-nitrotoluene	2000	2550	3
Para-nitrotoluenesulphonic acid	1980	2530	3
Para-toluenesulphonamide	245	314	
Para-toluenesulphonyl chloride	89	114	
Para-toluidine	267	342	
Para-toluidine-meta-sulphonic acid	74	95	
Peri acid	490	627	
Phenol derivatives	125	160	
Phenylenediaminesulphonic acid	148	215	
Phenyl J acid	126	161	
1-Phenyl-3-methyl-5-pyrazolone	202	259	
Phenyl-peri-acid	90	115	
Phthalic anhydride	9500	12350	143
Quinizarin	361	469	5
Rhoduline acid	94	120	1
5-Sulphoanthranilic acid	75	96	1
1-(4'-Sulphophenyl)-3-carboxy-5-pyrazolone	218	283	3
1-(4'-sulphophenyl)-3-methyl-5-pyrazolone	73	95	1
T-acid	1560	2000	24
Tobias acid	1210	1550	19
Toluidine	655	838	10
1:1'-4:1'-Trianthrimide	180	233	2
Vinyl sulphone intermediates	2000	2550	31
Total	99698	128031	15286

Demand projections for major raw materials

(1)	1989-90 (2)	1994-95 (3)	'99-200 (4
Organic chemicals			
Acetic acid	7957	9224	1070
Acetic anhydride	1126	1305	151
Acetone	362	463	56
Aniline	2000	3000	400
Anthranilic acid	110	141	17
Benzaldehyde	200	256	31
Benzene	21000	27000	3300
Benzoyl chloride	525	672	62
Benzyl chloride	120	154	19

	(2)	(3)	(4)
losolve	261	334	395
orobenzene	4400	5600	6800
nuric chloride	1921	2460	3000
thanolamine	511	654	800
thylaniline	325	416	500
thyl sulphate	186	238	290
nethylaniline	1545	1975	2400
nethyl sulphate	1254	1605	1550
oxy propylamine	160	205	250
yl acetoacetate	55	70	85
yl alcohol	4728	6052	7400
yl chloride	1100	1408	1700
ylene	94	120	150
ylene dichloride	291	372	450
ylene oxide	500	800	1000
rmaldehyde	2700	6800	9600
rmic acid	74	95	115
ycerine	918	1175	1450
xanediol	276	353	430
droquinone	184	236	300
droxyethyl acetate	135	173	210
ethanol	11000	14000	17000
ethylamine	154	197	240
onochloroacetic acid	460	589	720
onoethanolamine	48	61	75
phthalene	17000	22000	27000
triloacetic acid	425	544	650
trobenzene	9800	12000	15200
tho-dichlorobenzene	1500	1920	2350
xalic acid	284	364	450
xaloacetic ester	115	147	180
ra chlorophenol	88	113	150
rchloroethylene	147	198	230
enol	645	785	955
ridine	108	138	170
licylic acid	280	358	420
lphanilic acid	1300	1664	2030
gar	150	192	240
luene	9000	11500	14000
ca	9500	12160	15000
lenes	4000	5120	6250
otal	**121022**	**157396**	**193260**
) Inorganic chemicals			
uminium chloride	10000	12800	15600
uminium ingots	1538	1969	2400
uminium sulphate	66	84	100
mmonia	3560	4557	5550
mmonium chloride	734	940	1150

(1)	(2)	(3)	(4)
Ammonium nitrate	472	604	740
Ammonium sulphate	1647	2108	2570
Barium chloride	222	284	350
Boric acid	436	558	680
Bromine	550	704	900
Calcium carbonate	472	604	730
Calcium chloride	437	557	680
Carbon dioxide	3650	4672	5700
Caustic potash	8475	10850	13000
Caustic soda	50000	64000	78000
Chlorine	20000	25600	31000
Chlorosulphonic acid	10000	12800	16000
Copper chloride	90	115	140
Copper sulphate	1145	1466	1800
Disodium hydrogen phosphate	148	189	230
Ferrous chloride	520	666	810
Ferrous sulphate	385	493	600
Glauber's salt	10000	13000	16000
Hydrated lime	12500	16000	20000
Hydrochloric acid	47650	61000	75000
Hydrosulphite of soda	1844	2360	2880
Iron powder	12200	15600	19000
Limestone powder	7546	9659	12000
Magnesium chloride	54	69	85
Magnesium sulphate	145	186	230
Manganese chloride	154	197	240
Manganese dioxide	1340	1715	2100
Nitric acid	30000	38000	46000
Nitrogen gas (m^3)	75	96	120
Oleum 20-25%	24000	31000	38000
Oleum 60%	8000	10,250	12,500
Oxygen gas (m^3)	50	64	80
Phosgene	216	276	320
Phosphoric acid	89	114	140
Phosphorous oxychloride	190	243	300
Phosphorous trichloride	1485	1900	2300
Potassium carbonate	450	580	700
Potassium chlorate	150	192	250
Potassium chloride	3265	4180	5100
Potassium iodide	205	262	320
Potassium sulphate	1158	1480	1800
Raney nickel	110	141	175
Salt	55000	70000	850000
Soda ash	30000	38000	47000
Sodium acetate	1500	1900	2300
Sodium bicarbonate	2364	3025	3700
Sodium bisulphate	1810	2320	2830
Sodium bisulphite	5140	6600	8050
Sodium chlorate	1626	2054	2500
Sodium cyanide	1064	1400	1700

(1)	(2)	(3)	
Sodium dichromate	841	1076	1
Sodium dihydrogen phosphate	96	123	
Sodium hydrogen sulphide	1953	2500	3
Sodium hypochlorite	659	837	1
Sodium nitrate	165	204	
Sodium nitrite	4548	6000	7
Sodium sulphate	204	261	
Sodium sulphide	3147	4010	4
Sodium sulphite	163	227	
Sodium thiosulphate	226	289	
Sulphamic acid	284	370	
Sulphur	7800	10000	12
Sulphur dioxide	348	445	
Sulphuric acid	200000	256000	312
Sulphuryl chloride	746	955	1
Thionyl chloride	334	462	
Zinc chloride	438	564	
Zinc dust	1500	1875	2
Total	**599377**	**766681**	**936**
(C) Miscellaneous chemicals			
Activated carbon	360	468	
Auxiliaries	542	842	10
Calsolene oil	36	49	
Carbon black	358	358	4
Dextrine (maize)	1045	1370	17
Dispersing agents	4000	7500	120
Supercel hyflo	250	300	3
Wetting agents	660	870	10
Total	**7251**	**11757**	**171**
Grand total	**727650**	**935834**	**11469**

(Tonne

Dyestuff group	1989-90	1994-95	'99-20
Acid and direct dyes	2000	2800	33
Basic dyes	500	700	8
Optical brightening agents	100	150	1
Organic pigments/pigment dyes	1800	2600	29
Reactive dyes	2000	2800	32
Vat dyes	1200	1500	18
Other dyes	400	550	7
Total	**8000**	**11000**	**130**
Intermediates	10000	13000	160

News About New Projects

A BUILD-UP IN FAR EAST UNTRIES

he dramatic build-up in PTA capac-n the Far East continues unabated. latest is confirmation of plans for 50,000 m.t./year facility in Indone-

Mitsui & Co. and Mitsui Petrochem-Co. will collaborate in a joint enture the state run Pertamina to build this 0 million plant. Capacity is to be anded to an eventual 500,000 /year. The plant will initially use chant para-xylene, but an aromatics plex to manufacture 350,000 /year of para-xylene and 150,000 /year of benzene is expected to soon in supplies.

Other projects on the anvil in the Far include Mitsubishi Kasei's 250,000 /year plant also in Indonesia; and oco Chemical's 250,000 m.t./year t in China. ICI is poised to start duction at it's Taiwanese plant tly, and Mitsubishi's Korean project only recently commenced produc-.

TA demand in Asia is estimated at million m.t./year, rising to 4.8 mil- m.t./year by 1995, to account for of world demand. The growth is en by strong demand in polyester es and resins.

VIET SIBERIAN PROJECT TO CUS ON PLASTICS

nvironmental objections have ed the Soviet Ministry of oil refin-nd Petrochemicals to recast its pro-d project at Surgut in Western ria, with a focus now on plastics. ost of chemicals including phenol, one, aromatics, styrene and MTBE been axed. The core unit, a cracker produce 330,000 m.t./year of eth-e and other hydrocarbons. Projected pattern of products along with proposed export plans are as below:

The first stage of the project, producing ethylene and polyethylene is slated for completion by 1994, and other projects are expected a year later.

The project is expected to meet some of the local demand for plastics and more importantly prevent the wasteful flaring of huge quantities of associated gas.

	Output ('000 m.t./ year	Export ('000 m.t./yr.
Ethylene	330	--
Propylene	104	--
Butylene-butadiene fraction	55	Nil
Polyethylene	300	150
Polypropylene	110	30
Ethylene glycol	120	80
Diethylene glycol	10	Nil

ZIMMER TO BUILD POLYESTER COMPLEX IN SOVIET UNION

Zimmer AG will construct a DM100 million complex to manufacture 11,000 m.t./year of polyester filament yarn. A second line to make another 8,000 m.t./year will be added later. The two lines are expected to come onstream by 1995. Zimmer will supply all the equipment and provide for commissioning and construction activities.

The lines are expected to replace viscose fiber capacity, which are to be phased out on environmental grounds.

DUPONT, TEIJIN TIE-UP ON PET FILM

DuPont and Teijin have signed a letter of intent to set up a joint venture to market and subsequently manufacture, polyethylene terephthalate film (PET) worldwide, except Japan.

The mutually beneficial move is expected to give Teijin better penetration into American markets.

NEW STYRENE-MALEIC ANHYDRIDE JOINT VENTURE

Arco Chemical is tying up with the Japanese concern, Mitsui Toatsu, to set up a 70 million lb/year plant to make its *Dylark*, styrene-maleic anhydride resin. Arco already has a 70 million lb/year plant in the U.S. and the new project, to be located at Osaka, is expected to get going in the second quarter of 1991.

DSM TO BUILD MELAMINE PLANT IN NETHERLANDS

DSM, has signed a preliminary agreement to build a melamine plant in Indonesia with local firms. The 50,000 m.t./year plant will be finalised early next year.

DSM is already the world largest producer of melamine with a capacity of 90,000 m.t./year in the Netherlands and another 50,000 m.t./year through a joint venture in the U.S.

ARGENTINA UPS MALEIC CAPACITY

The Argentinian company Maleic has completed a new 8000 m.t./year maleic acid plant taking its capacity to 14,000 m.t./year, the largest in Latin America.

The plant designed by the Scientific Design Co. is claimed to the most modern and runs an incinerator to flare off liquid effluents.

International Market Update

HUNGARIAN CHEMICAL INDUSTRY FACES GRIM TIMES

An 80% hike in the price of gas supplied to the industry and a 30% hike in the electricity rates are the latest woes of the Hungarian Chemical Industry which exported some $300 million a year of petrochemicals. The move comes in the wake of Soviet decisions to cut back on supplies of crude, and to insist on payments in hard currency.

Industry sources complain that they were not consulted before the latest round of increases in feedstock prices, and warn that the moves will seriously affect the export earnings, which are now the largest foreign exchange earners for the country.

HULS CLOSES PHTHALIC PLANT, MARKETS TIGHTEN

Huls (Germany) have announced that it will close, its' 55,000 m.t./year facility to produce phthalic anhydride. The company has noted that margins in the industry do not permit the kind of investments needed to comply with environmental regulations.

Earlier Neste had announced closure of its' 25,000 m.t./year facility, and closure of three producers in Turkey have removed another 22,000 m.t./year from the markets. The European position has also been mirrored, in U.S. markets also where BASF has pulled out around 105,000 m.t./year out of the market. Fourth quarter deliveries are being quoted around 36-37 cents/lb, a rise of 7 cents/lb.

The onset of the Gulf crisis has caused a huge increase in prices of ortho-xylene with fourth quarter deliveries being quoted at DM1000/m.t., up 61% over earlier levels.

MTBE PRICES STABILISE AFTER SURGE

Prices of methyl tert-butyl ether (MTBE) have fallen below levels prevailing in August 1990, largely due to reduced offtake by oil companies. In the three weeks following Iraq's occupation of Kuwait prices moved up to a high of $650/m.t. fob Rotterdam, from around $450/m.t.

Since then prices have crashed and supplies are being quoted in the $370-$410 per m.t. range, a fall of more than $200 per m.t.

U.S. prices are now ranging at $1.05/lb fob, following a high of $1.50 some weeks ago.

With gasoline prices moving up, the price differential between regular and premium grades of gasoline initially soared, causing motorists in the U.S. to shift to cheaper regular grades. U.S. markets were awash with premium grades and MTBE demand declined dramatically.

Prices are now expected to stabilise around existing levels.

EC OPENS ANTI-DUMPING INVESTIGATIONS ON THE SOVIET UNION

The EC has opened anti-dumping investigations into imports of potash from the USSR. In the period of 1986 to 1989 Soviet share of the EC potash market had increased by around 5% to 11.3% while domestic European production dropped in the same period from 72% to 65%.

The complainants argue that poor domestic prices had led to European operating rates to fall from 84% to 78%.

EC PETROCHEMICALS INDUSTRY FACES OVER-CAPACITY

The European petrochemicals ind faces serious overcapacity in the 1 with new plants planned during the c icals boom of the late 1980s co onstream during a period of slow gr senior executives told the *Financial T* conference on European petrochemic London recently.

Mr. Bryan Sanderson, Chief Exec of BP Chemicals, warned that the " mented" European industry faced a midable squeeze" which should lead restructuring. He pointed out that ha the European capacity for producing fins - key building blocks of petroch cals - is still in the hands of nat companies with no capacity outside home country. "This hardly seem appropriate structure with which approach the European market post-1 It is as inappropriate for petrochemica it is for airlines, aerospace, the autom industry and almost any other comme operation."

Mr. Jim Gordon, chemicals co-ordi for the Royal Dutch/Shell group, said: foresee a significant overcapacity affe overall industry performance" until mid-1990s, as a result of decisions alr taken inside and outside Europe." US rochemical companies would be quick close excess capacity than their Euro counterparts, Mr. Gordon said.

Some speakers at the conference excited about long term market oppor ities in eastern European. But Mr. Go warned against expecting too much soon. Mr. Alan Plaistowe, President o Chem Systems Group, described a det study of the East European industry b consultancy.

"We are coming to the conclusion the capital stock of the industry may be as bad as everyone seems to think said. "Some of the modern, larger p have some chance of survival

rnisation and improved operations.

e conference Chairman, Mr. Hugo , Director General of the European nical Industry Federation, said that nmediate issue facing the industry e outcome of the Gulk crisis.

RACOR INC. AND POLYMER ORATORIES LTD. ENTER NT TECHNOLOGY AND RKETING AGREEMENT

olymer Laboratories Ltd., who's ration Sciences Division specialin the development of high performpolymeric chromatography media, Sepracor Inc., a leader in the develent of technologies and systems for nstream protein processing, have ounced the signing of a wideging joint technology and marketing eement.

Under the terms of the agreement, racor will have the right to market ldwide Polymer Laboratories' full of high performance polymeric omatography media and prepacked umns for analytical, preparative and cess-scale protein purification. This l include Polymer Laboratories' line porous polymeric beads for the high ed analysis and purification of proıs. In addition, Sepracor and Polymer Laboratories will continue to develop and market new chromatographic media for protein purification by adapting proprietary surface chemistries to Polymer Laboratories' bulk polymeric beads.

Polymer Laboratories will have the right to manufacture the new products developed by Sepracor and to market these products to the analytical market for other applications.

"For some time, Sepracor's strategy has been to integrate its fast, up-front, membrane-based protein capture technology with advanced, high resolution chromatography", said Dr. Robert A Dishman, Executive Vice-President and Chief Operating Officer at Sepracor. "By gaining access to Polymer Laboratories' advanced polymeric chromatography supports, Sepracor now has the ideal means with which to realize this goal".

SENSYCON ON SOLID GROUND AFTER ONE YEAR

One year after the merger of Degussa-Messtechnik, Hanau, and VDO Messund Regeltechnik, Hanover, into Sensycon Gesellschaft fur industrielle Sensorsysteme und Prozessleittechnik mbH, which has its headquarters in Hanover, the new company - a fully owned subsidiary of the Degussa parent company in Frankfurt -- has achieved a sound market position. By taking over technical expertise and customers from the relevant work areas of its two well-established parent companies and with a workforce of 1100, Sensycon enjoyed a sound starting position.

The most pressing initial task was therefore to synchronise the two previously independent field fleets in order to achieve even greater customer proximity. The two business areas Sensorelements and Process Technology were sub-divided into the work areas: Elements, Temperature, Process instruments and Process Control Systems, each of which is now independently responsible for development, manufacture and sales, in an effort to improve their market effect.

In addition the three-person management board, under the presidency of Hans-Jurgen Werth, has initiated the development of new products, including temperature layer measuring resistors in SMD technology and new software for the CM 1 process station.

The company is now also active in Eastern Germany, with two sales branches in Ilmenau and Jena and a production plant in Geraberg.

Environment

XIC LEAK AT SANDOZ

andoz has confirmed leakage of e 2000 litres of chlorosulphonic acid s dye intermediates production facil- at Huningen. The leak occured due broken seal in a valve in a produc- vessel, and Sandoz noted that there no danger to either local residents o the environment. Water used to t the release was contained, avoid- an incident similar to the one that ured at Ciba-Geigy in Basle.

NDOZ AGREES TO CUT TAL EMISSIONS

andoz has agreed with the Part of terdam, for cutting emissions of per and chromium into the Rhine r, to a level of around 2000 kgs./year 995. Further cuts will be envisaged r, and these reductions agreed upon cut emissions to about half of their ent levels.

he Dutch port authority is planning 1 clean-up agreements with a ber of other producers, between le and Rotterdam.

ENTISTS CALL FOR GLOBAL DUCTION IN CO_2 LEVELS

cientists at the second world climate ference held recently in Geneva e out with a tough agenda, calling n reduction of 50% in current levels he middle of the next century. The ntists have urged that a reduction of %/year starting now would be ired.

ne scientists have noted that with production tapering off, CO_2 will me more important as a cause of global warming. Some 75% of the CO_2 originate from the industrialised nations with 40% being accounted for by the U.S. and USSR.

Many European nations have agreed to stabilise CO_2 emissions by 2000AD, with the U.K. being given an extension up to 2005. Some countries on the other hand will achieve these targets earlier and Germany, Netherlands and Denmark actually plan on reducing emissions 30% by 2005. The U.S., probably the biggest contributor, has come in for wide criticisms, as it has not committed itself to any cut back. On the contrary it expects emissions to increase by 15% by the year 2000AD.

NEW WATER TREATMENT PLANT FOR FARMS

An effluent treatment process, developed by one of the world's biggest chemical companies to tackle industrial waste problems, has been scaled down to produce a water treatment plant small enough to deal with chemical waste on farms.

The process, called Carbo-Flo, was developed in Britain by ICI for purifying industrial effluents. It is designed to remove unwanted organic substances from water in order to reduce the risk of pollution and help protect the environment.

Carbo-Flo is particularly suitable for dealing with liquid waste from the chemical industry, and it has been used for more than 16 years at ICI factories, including those that manufacture herbicides and other chemicals widely used in the agricultural industry. Water that has been treated by the Carbo-Flo process is non-toxic, colourless and almost odourless, and can be disposed of safely in a soil soakaway.

A small volume of solid sludge is also produced during the cleaning process, and accumulations of this should be disposed of in a landfill site or by a waste disposal contractor.

The small-scale version of the Carbo-Flo process was designed to help farms and other small businesses deal with water contaminated by chemical waste. This is a growing problem for many farmers because of increasing concern over the handling of agrochemicals, including the disposal of residues left over from crop spraying, sheep dipping, and other operations where hazardous chemicals are used.

The range of chemicals used in agriculture has increased, and regulations exist to control their storage handling and use. In Britain these provisions are contained in the Food and Environment Protection Act, which also includes rules to ensure that water contaminated by chemicals and any unused residues are disposed of safely.

The surplus liquid left in the sprayer tank, and even water used to wash out the tank and spray lines at the end of a spraying session, are likely to cause serious pollution if they are simply tipped into a stream or pond. Similarly, if the liquid is poured on to the ground it may seep through the soil and eventually contaminate drinking water supplies.

Regulations to control the disposal of chemical residues have been accepted by most as a sensible precaution to help reduce the risk of environmental damage. The new rules, however, also make it difficult for some people to find a convenient, safe way to get rid of potentially harmful liquids.

Sentinel tests

A scaled-down version of the Carbo-Flo process was developed by ICI to deal with this problem. The result

is the Sentinel effluent treatment plant, designed to clean dilute solutions of organic chemicals.

The Sentinel is made in Chichester, southern England, by E. Allman and Company, one of the leading crop spraying equipment manufacturers in Britain. Allman became involved in the project because it has suitable engineering resources and a well established marketing organisation for agricultural equipement.

The equipment was developed by Allman engineers in collaboration with ICI, and a prototype of the plant was used for an independent test programme in 1987. The tests were carried out by the Ministry of Agriculture, Fisheries and Food's Agricultural Development and Advisory Service at its Harpenden Laboratory, near London.

Liquid used for the tests was a cocktail of pesticides, added together in water to produce a solution containing 25 percent of the maximum concentrations recommended for crop spraying. This mixture was processed in the Sentinel plant, using the procedure recommended by ICI, and samples were taken at intervals for analysis. Chemicals in the test mixture included widely used products from the most important pesticide categories representing a typical season's spraying programme on an arable farm. It contained 2, 4-D, demeton-S-methyl, gamma-HCH, pirimicarb, propiconazole, cypermethrin, mecoprop and paraquat. This mixture was tested twice by the Sentinel equipment, and a third test was carried out on water contaminated by sheep dip and a solution containing pesticide waste, which was mainly organic solvent-based.

Analysis of the final effluent showed that a high proportion of the chemicals had been removed by the Carbo-Flo treatment process. The level of each pesticide in the original cocktail was reduced to less than 0.05 g/ml after treatment, and for most the content was less than 0.02 g/ml in the final liquid.

Carbo-Flo was also tested on an intensive arable farm where chemical disposal problems had been experienced, and this provided an opportunity to assess the process and equipment in commercial conditions without technically qualified supervision.

The treatment process in Sentinel is carried out on a batch basis. Materials used are pre-packaged in the correct amounts for one batch. This means the plant does not have to be operated by a qualified chemist, as there is no measuring, weighing or mixing to be done.

Flocculation and filtration

There are two main stages in the process. The first is a flocculation operation in which suspended solids are collected in a sediment. The sediment accummulates as a sludge which has to be removed and disposed of safely. A 1,000-litre batch of liquid produces about 18 kg. of sludge, with a water content of approximately 80 percent.

Stage two involves filtration, using gravel and a carbon module to remove dissolved organic matter. Each carbon module remains effective for about 20 batches of effluent, and a colouring indicator in each pre-pack of treatment materials shows when the carbon module should be replaced. The final liquid can be allowed to soak away into the soil, but there may be enough chemical remaining in the liquid to damage fish if it is discharged directly into a stream or pond.

Sentinel is supplied as a standard package to deal with 1,000-litre batches of liquid. The equipment is mounted in a steel frame and can be moved on a forklift truck or the three-point linkage of a tractor.

It is supplied complete with a 12 V dc or 240 V ac electric motor to operate an agitation paddle, and there is also a filling pump powered by either a 1.49 k/W single phase motor or a 2.24 kW petrol engine. The unit measures 2.2 x 1.16 x 3 m, and the shipping weight is 680 kg.

News from Japan

HYLENE MAKERS INCREASE LIANCE ON DOMESTIC APHTHA

Japanese ethylene producers are hurdly increasing their reliance on mestically-produced naphtha in the ke of steeply higher overseas naphprices and greater volumes of crude processed domestically. This trend came more visible this year with adily rising overseas naphtha prices.

In the January-June period, depenence on domestic naphtha had risen to 31%, compared with 4.87% last year. llowing the Iraqi annexation of uwait in August, 50% of the naphtha reviously obtained from Iraq and uwait was shifted to domestic produc-on. This event, coupled with a climbg domestic procurement ratio by panese oil refiners, has pushed the petchemical industry towards an xpanded domestic naphtha-producing tructure. It now appears that ethylene akers will reach a 10% dependence on omestic naphtha in the July-December eriod.

Reflecting the severity of obtaining equired supplies, ethylene makers are iversifying feedstocks through prourements of such raw materials as utane and heavy NGL, and formulaing measures to switch from foreign to omestic raw materials.

Imports of naphtha, an ethylene feedstock, were essentially liberalized when tructural depression faced the petrochemical industry in 1982. Dependence on imported naphtha has risen swiftly since that time, with domestic ethylene producers rushing to acquire import (storage) tanks and otherwise build up the required infrastructure.

The industry became 95% dependent on imported naphtha, and successfully used the cheap supplies to strengthen its international competitiveness. Overseas naphtha prices began creeping up in mid-1989, however. Currently, South Korea and a number of other new naphtha-consuming countries entered the stage, making it more difficult to obtain cheap sources of the material. Aggravating the situation was Iraq's incursion into Kuwait. One result of the Persian Gulf crisis was the disappearance of Iraqi and Kuwaiti naphtha, and higher prices as these volumes were shifted to Saudi Arabia and other countries.

During this period, a framework was designed for expanding domestic crude oil processing volumes, and plans were drawn up to ensure stable supplies of gasoline, kerosene and other oil products. At first, priority was given to light grades for gasoline. But the end of the gasoline demand period and surge in naphtha prices overseas enhanced the profitability of naphtha. This development, together with vigorous demand from petrochemical makers, prompted petroleum refiners to boost the percentage of naphtha produced in Japan.

Companies operating ethylene complexes have been aggressively diversifying raw material imports, extending to butane and heavy NGL, but imports are limited by the availability of storage and handling facilities and problems with the domestic tax system. As a result, ethylene makers have no choice but to hike their dependence on domestic naphtha to obtain stable supplies. They have already boosted second-half domestic reliance beyond the first half figure, making it likely that a 10% ratio will be achieved this year.

APPROVAL SYSTEM GOES INTO FORCE FOR SPECIFIED CFC EXPORTS

The Ministry of International Trade and Industry (MITI) on October 11 decided to make specified CFC (chlorofluorocarbon) exports subject to approval in accordance with the provisions of the "Foreign Exchange and Foreign Trade Control Law". Accordingly, it revised "Regulations Concerning Operation of Export Trade Control Ordinance" (issued under date of November 6, 1987), for enforcement from October 12. Specified CFC's are some of the materials specified in the Ozone Layer Protection Law.

The Montreal Protocol calls for total abolition of the gases by 2000. There is a growing tendency to move up the dates of the scheduled reduction. MITI explained that the system of approval for exports was established "from the standpoint of securing a more appropriate supply". It can be thought, however, that MITI took into consideration the international trend for CFC reduction.

Specified CFCs comprise five items — chlorobentafluoroethane (CFC 115), dichlorodifluoromethane (CFC 12), dichlorotetrafluoroethane (CFC 114), trichlorotrifluoroethane (CFC 113), trichlorofluoromethane (CFC 11) —and their mixtures. Approval of exports is required in the case of those contained in tanks for transportation or storage, cylinders, cans and other receptacles, and in the case of mixed solvent falling under No. 3814.00 in the list of export items. However, the following items are excluded: (1) those which are used as injection materials for aerosol cans; (2) those which are used as cooling medium for freezing and refrigerating plants; (3) those which are used as heating medium; and (4) foaming products and the items contained in their materials.

The approval system for exports is applied to all areas. An application for approval of exports must be presented to the International Trade Office of the General Affairs Section of the Basic Industries Bureau. It is necessary to present the original text and a copy of the papers certifying export contracts or written export contracts, besides two written applications (original text will be returned later).

Those who have secured export approval must present monthly records of shipment (of materials causing destruction of the ozone layer) at the end of every quarter.

SHELL INTERNATIONAL CHEMICAL FOCUSING CAPITAL SPENDING ON ASIA

Shell International Chemical (U.K.) is scheduled to invest a total of $1,500 million in Asian countries in the coming three years. In Indonesia, the British firm plans to build a petrochemical complex (ethylene, 350,000 t/y; propylene 220,000 t/y; polyethylene 300,000 t/y; polypropylene, 160,000 t/y and ethylene glycol, 100,000 t/y in a team-up with Mitsui & Co., and C. Itoh — both big Japanese traders — and local interests including Pertamina. A company official claims: "Indonesia has attained high economic growth and most of the planned production will be sold on the domestic market".

In India, the company has applied to the government for approval of an investment plan aimed at constructing an additional petrochemical plant. It is running a petrochemical complex in the country on a joint-venture basis.

In Malaysia, it has worked out a plan for building a 30,000-t/y polystyrene plant. In Japan, it aims to construct a thermoplastic-elastomer plant in partnership with Japan Synthetic Rubber. In South Korea, it — together with Kumbo Petrochemical Industry (South Korea) — is building production facilities for phenol, bisphenol A and epoxy resin with start-up scheduled for the end of this year or early next year.

The company's sales break down into 51.1% for Europe, 31.1% for the U.S., 11.1% for Asia and 6.6% for South America. The company expects sales in Asia and South America to show higher growth than in the States and Europe. It envisages raising the share of the former two areas to 40% ten years hence by stepping up capital spending there.

Petroleum-based petrochemical producers in Europe — including Shell International Chemical — have been intent on building up their downstream business in expection of increased earnings stemming from price boosts for oil products, which have been triggered by the Gulf crisis.

KYOEISHA CHEMICAL, GERMAN FIRM TIE UP FOR PAINT ADDITIVE MARKETING

Kyoeisha Chemical Co. of Japan and Tego Chemie Service GmbH of Germany have reached an agreement on tie-up in the marketing of and production technology for their respective paint additives. Under the agreement, both companies will import from next January the partner's paint additives and market them in Japan and Germany under the importers' brand names.

Tego Chemie is a wholly owned subsidiary of Th. Goldschmidt GmbH of Germany. The Japanese firm will be transferred from Th. Goldschmidt Japan Co. — wholly owned Japanese subsidiary of Th. Goldschmidt — the sales rights for such chemicals of Tego's, and will become in reality the sole agent of Th. Goldschmidt in Japan for the chemicals. Kyoeisha also plans to manufacture in Japan, Tego products in the future.

Behind this is Kyoeisha's strong desire to expand its product range as well as advance into West Europe and Th. Goldschmidt's intention of expanding and strengthening operations in Japan. Tego Chemie will also market the partner's additives in Europe through its sales routes and those of other Th. Goldschmidt subsidiaries.

Both companies believe that the partnership will offer to their customers a wider range of paint additives and give them a freer choice of the products as well as better customer services. The agreement also gives each company fr access to the partner's R&D facilit and laboratories to tackle the technol gical issues common to them.

The Japanese firm plans to sell ¥1(million of the imported additives Japan in the initial year with their sal five years ahead targeted at ¥500 m lion.

It has long been engaged in surfa tant production and marketing and ha in recent years branched out into pai and polymer additives for diversifica tion. It opened in 1988 a liaison offic in New York and has established foo ings in the U.S., Southeast Asian an African markets, but is lagging behin other counterparts in operations i Europe.

TOP FLAVOR & FRAGRANCE MAKER BOOSTING FLAVOR-MIXING CAPACITY

Takasago International Corp., is now constructing a flavor-mixing plant at its Hiratsuka factory (Kanagawa Prefecture) by investing about ¥2.9 billion.

The plant scheduled to be completed by the end of next year will increase the company's flavor-mixing capacity there by 80%.

The plant construction is the nucleus of its new 5-year program aimed at consolidating its business structure for flavors and fragrances and diversification as well as pushing globalization.

Under the plan, Japan's top flavor-and-fragrance maker has been striving to streamline the production facilities at its Iwata (Shizuoka), Kashima (Ibaraki) and Hiratsuka factories to raise production efficiency. The company intends to modernize and concentrate its facilities for synthetic flavors and fragrances at the Iwata factory, those for refining aromatic substances at the Kashima factory and those for mixing them at Hiratsuka factory, respectively.

e new Hiratsuka plant is designed
e a 4,000-t/y mixing capacity, up
r cent over the capacity of the old
it will be a 3-storey building with
l floor space of 6,000 m².

STU, KUREHA CHEMICAL JOIN HANDS IN NEW CCS ELOPMENT

Fujitsu Ltd. has announced the
ng of an agreement with Kureha
nical Industry Co. for joint deve-
ent of a new computer chemistry
m (CCS). The endeavor will focus
olecular and quantum chemistry-
l theoretical calculations, and
e a molecular design-support
m integrating molecular modeling
ions and a visibility function for
zing results. The two companies
d a similar agreement six years
and in 1986, successfully engine-
the "ANCHOR" system. The
sion to team up again and develop
w generation system was made in
ght of the dizzying pace of change
in the computer chemistry field.

ujitsu is also involved in research
domestic and overseas research
nisations, including Australian
onal University, and several joint
ects with commercial objectives.
company plans to steadily
ounce research results through the
of the year, and launch a CCS mar-
ng campaign sometime next year.

NDARDS FOR NATURAL OD ADDITIVES SEEN BEING

pan Food Additives Association
begun to make preparations for
blishing next March standards for
ral food additives. Standards for
e chemically synthesized have
ady been established and food pro-
ers are obliged to specify food addi-
s — both natural and synthetic —on
l packages as from next July. There
n official document covering stan-
ls for 10 natural food additives. In addition, the association's predecessor previously worked out standards for another 43 natural food additives. On the other hand, FAO/WHO joint Expert Committee for Food Additives has also established standards for a total of 42 items of natural food additives. The association intends to coordinate and unify the three types of standards for natural food additives, thereby establishing those that will be accepted by the international community. It envisages improving domestic standards using advanced scientific analysis technology.

It will concentrate its energy on establishing standards for colorants, antioxidants and sweeteners. According to the Ministry of Health and Welfare, there are about 1,000 natural food additives including approximately 500 flavors. The association aims to establish new standards covering roughly 60 items.

WAKAYAMA SEIKA PRODUCES 4,4'-DIAMINODIPHENYLETHER'

Wakayama Seika Kogyo Co. has started producing 4,4'-diaminodiphenylether (DPE) — raw material for polyimide/polyamide resins — using a new manufacturing plant for raw materials for engineering plastics. The new plant is located at its Kainan factory (Wakayama Prefecture). The resins are widely used in electronic materials with the prosperity of the electronics business in the background. If the 4,4-DPE production gets successfully under way, the company intends to produce 4, 4'-diaminodiphenylsulfone, 2, 2'-bis (4-(4 aminophenoxy) phenyl) propane and 4,4'-diaminobenzanilide. On completion of the new plant, the company shifted DPE production from its Wakayama factory to the Kainan factory, which has become the company's production base for heat-resistant high polymers. At the same factory, it has already build production facilities for dichlorohydrabenzene — pigment intermediate — and o-nitrochlorobenzene derivatives —dye/pigment intermediates.

New Developments from Japan

AWA BEGINS CLINICAL OF AGENT AGAINST ET DISEASE

awa Pharmaceutical Co. will art clinical testing of 'FK 506" osuppressant for treatment of an mune disease. The agent will first plied to Behcet disease, a t-to-cure disease causing serious with eyes. This follows the in July of FK 506 clinical test- the U.S., Europe and Japan in a prevent patients from rejecting anted organs. Fujisawa plans to lly extend the application of the other autoimmune disases such use collagen disease and rheu-

closporine has so far been used to ss patients' rejection of trans- organs and FK 506 has proved e greater immunosuppressing than cyclosporine, attracting n especially in the West where splantation of organs prevails. It absorbing the attention of the se concerned as it is certain that ansplantion will increase in the

pan, FK 506 clinical tests began tempt to suppress rejection at the transplantation of the kidneys now used, too in the case of anting the liver. Animal tests ted by Professor K. Masuda of dical Department of Tokyo Uni- show that FK 506 is more effec- treatment of Behcet disease —a t-to-cure disease that may lead ness — than in the case of using orine. Fujisawa thus hurried to ke the clinical testing of FK 506.

NE REACTION APPLIED W SENSOR: MATSUSHITA

ushita Electric Industrial Co. has ed a biological sensor designed ently detect target materials on the strength of an antigen-antibody reaction.

"The company has applied the device to the manufacture of TNT-detecting equipment, which is large-sized but, it claims, will be scaled down to desktop-size through, for example, improvement of detecting signals.

It has established basic production technology for monoclonal antibodies indispensable to the antigen-antibody reaction. The new sensor will be used for detecting residual agrochemicals and small materials.

ACTIVE CARBON WITH FINE METAL POWDER HAS ANTI-BACTERIAL EFFECT

A research group at Hiroshima University has succeeded in developing an ultrafine silver particles-contained active carbon having an excellent anti-bacterial property by means of the method for producing a new-type metallic particle-carbon composite it has also developed.

The porous carbon — active carbon — in which ultrafine silver particles are uniformly dispersed has proved to have strong resistance to E coli, pyocyanic bacillus and hay bacillus, etc.

It is easily made into fibrous form, granules and pellets, the researchers involved say. They believe it will be commercially applied in various fields and may be marketed within two years.

Active carbon of this type is produced by sintering, in the presence of inactive gas, a mixture of a macromolecular metallic complex or pitch and an organic metal. This process is easy to carry out and as the organic metal, gold, silver, copper, iron, cobalt, rhodium, nickel, platinum and mercury can be used to give the active carbon a bactericidal

property. Silver has been chosen because it is not easily dissolved in water, sticks firmly to the carbon, maintains activity for a long time and can be processed into a variety of forms.

MITI TO DEVELOP NEW-TYPE CFC USED AS COOLANT FOR HEAT PUMP

In compliance with the Montreal Protocol, the Ministry of International Trade and Industry (MITI) has inaugurated a 5-year project aimed at developing a new coolant (3rd generation CFC) for a compression-type heat pump. The project calls for a total of ¥5,000 million in R&D expenses. The said protocol is aimed at completely banning use of the specified CFCs (1st-generation CFCs) after January 1, 2000. It is forecast that 2nd-generation CFCs will be put into practical use on a full scale after 1992. A MITI official says: "It will be difficult to utilize 3rd-generation CFCs on a commercial basis during the current century. MITI aims to pioneer an alternative to CFC-114 now used as a coolant for a heat pump. The target product is required to fulfill the following conditions: (1) its boiling point is on a reasonable level in which waste heat of 30-60°C can be efficiently utilized, (2) it is highly stable in the high temperature range between 100 and 150°C, (3) equal or superior to CFC-144 in terms of economic efficiency, (4) compatible with lubricant, (5) flame-retardant, (6) nondestructive to the ozone layer and (7) it hardly produces the greenhouse effect. The targeted coolant will be a fluorine compound containing alcohol or ester: it will have a new molecular structure completely different from that of existing products.

ULTRAHIGH-PURITY WATER CAN BE RECYCLED: KURITA

Kurita Water Industries Ltd. has developed a recycling system for ultrapure wastewater discharged from manufacturing processes for semiconductors.

The new process incorporates a logical reactor, in which oligotro bacteria immobilized on special car take carbon contained in the waste ter: carbon stems from the presenc isopropyl alcohol and other organic vents. The bacteria can be remo from the carriers using the "Corru Spiral UF" ultrafilter. In conventi methods, ultraviolet rays are used fo treatment of such carbon. The recycling system is almost equal to conventional methods in initial cost its running cost is about half the latt In addition, installation space with former is approximately 30 per cent than with the latter. The company a to market the recyling system for us the production of high-density chip DRAM chips of 4M or higher capac Ultrahigh-purity water is being incre ingly recycled in Japan's semicond tor industry.

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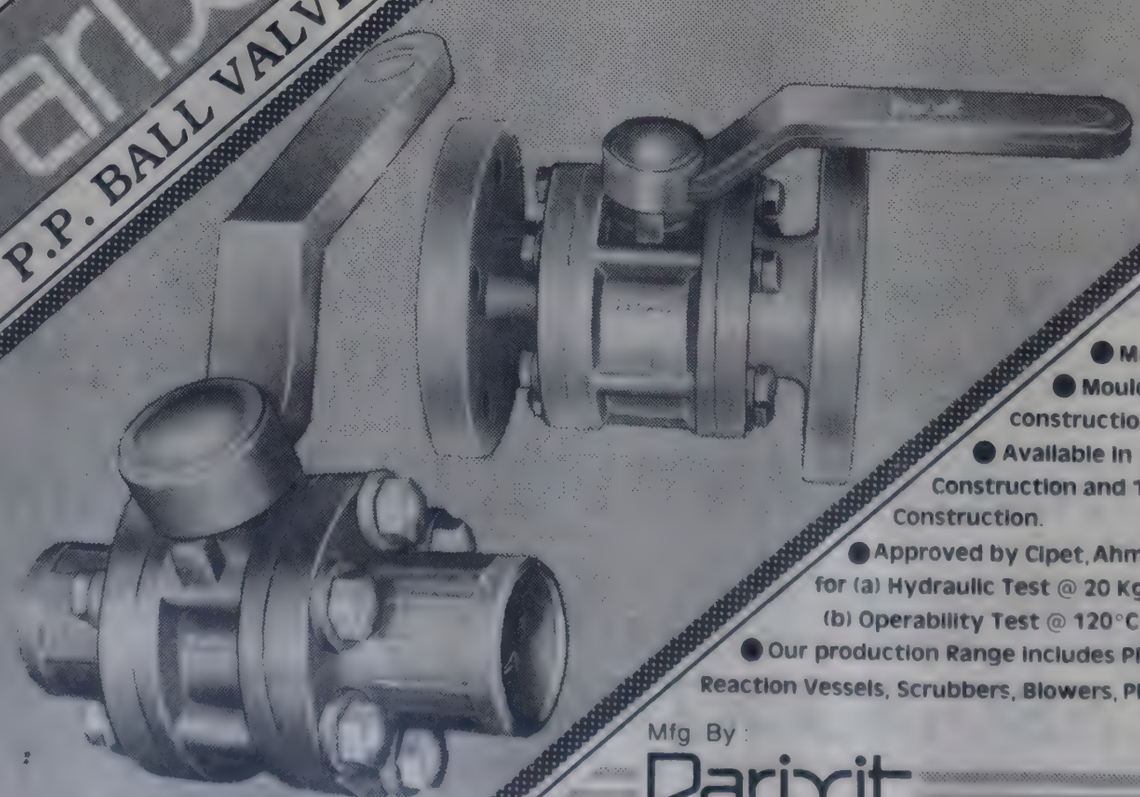

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MARKET INFORMATION

MEK maintains high levels

Prices of methyl ethyl ketone continued to rule at high levels in the Bombay chemicals market during the week under review. Although Cetex Petrochemicals had resumed production, virtually no material has come into the market.

Acrylamide firmed up slightly after being shifted from OGL to actual users category. Cyanuric chloride firmed up on poor availability of imports. Availability of dye intermediates remained poor and trading was moderate.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent -- and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of the market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on December 11, 1990)

INDUSTRIAL CHEMICALS	Per Kg.
Ammonium sulphate	2.50
Ammonium phosphate (Mono)	16.00
Ammonium phosphate (Di)	16.00
Ammonium carbonate (Di)	17.00
Ammonium bicarbonate	6.00
Ammonium chloride	4.00
Ammonium nitrate	6.50
Arsenic white powder	22+ST
Acrylamide (Resale)	85.00
Barium carbonate	18.00
Bleaching powder (33% Cl)	5.00
Borax (Granular)	19.00
Borax (Powder)	24.00
Boric acid (Tech)	45.00
Bisphenol-A	75.00
Butyl carbitol	106.00
Caustic soda (Flakes)	12.80
Caustic soda (Solid)	12.00
Caustic soda (Lye)	11.50
Calcium chloride 70% (Solid)	3.25
Calcium chloride 75-80%(fused)	3.50
Calcium chloride 36% (Anhydrous)	5.00
Calcium carbonate (precipitated)	6.00
Calcium carbonate (Activated)	5.75
Cobalt oxide	550.00
Cresylic acid	62.00
Camphor (Indian)	107.00
Cream of Tartar (Tech.) China	70.00
Citric acid (Belgium) (Resale)	47.00
Citric acid (Indian) (Resale)	44.00
Copper sulphate	25.00
Chromic acid	70.00
Ethylene urea	65.00
Ferric chloride (Lumps)	9.00
Ferric chloride (Anhydrous)	20.00
Glue flakes	15.00
Glue sheets	6.75
Gohsenol GH-17	130.00
Hydro	45.00

Hyflosupercell	30.00
Hexamine (Resale)	39.00
Industrial Wax	25.00
Litharge	40.00
Lead Acetate (Tech.)	39.00
Lithopone	34.00
Magnesium chloride (Crystal)	2.75
Menthol crystal (Flakes)	360+Ex+ST
Menthol bold	425+Ex+ST
Menthol crystal cold	395+Ex+ST
Magnesium carbonate (Japan)	30.00
Magnesium carbonate (Indian)	26.00
Maleic Anhydride (Resale)	45.00
Mercury (34.5 Kgs)	10,800.00
Nickel chloride	110.00
Oxalic acid (Resale)	14.00
Peppermint oil (Rectified)	188+Ex+ST
Potassium carbonate (Indian)	28.00
Potassium carbonate (Imported)	32.00
Potassium bichromate	42.00
Potassium phosphate (Mono)	34.00
Potassium phosphate (Di)	25.00
Polyvinyl alcohol (No. 117)	93.00
Polyvinyl alcohol (No. 173)	150.00
Polyvinyl alcohol (No. 208)	170.00
Paraformaldehyde (Resale)	22.50
Phthalic anhydride (Resale)	58.00
Pentaerythritol (Resale)	52.00
Paraffin wax	25+ST
Rangolite (German)	96+ST
Rangolite (Czech.)	80.00
Rangolite (China)	75.00
Sodium sulphate (Fine)	3.75
Sodium sulphate (Coarse)	3.50
Sodium sulphide 50-52% (Flakes)	11.50+ST
Sodium sulphide 58-60% (Flakes) (TCL)	25.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale) per 50 kg.	1,300.00
Sodium chlorite 80% (Spain)	100+ST
Soda Ash (Tata)	5.50
Soda Ash (Birla)	5.50
Soda Ash (Imp.)	5.50
Sodium bicarbonate	7.00
Sodium bisulphite	8.00
Sodium silicate	5.50
Sodium acetate	8.00
Sodium alginate	450.00
Titanium Dioxide (Anatase)	60.00
Titanium Dioxide (Rutile -- RCR_2)	95+ST
Tartaric acid	220.00
Trisodium phosphate	12.00
Thiourea	75.00
Urea (Tech.)	3.00
Vacuum salt	1.00
Zinc Dust	52.00
Zinc Oxide	58.00
Zinc chloride powder (Tech.)	20.50
Zinc sulphate	7.00

SOLVENTS	Per Kg.
Acetic Acid Glacial (Resale)	16.50
Acetic Anhydride (Resale)	40.00
Acetone (Resale)	24.50
Adipic Acid	85.00
Aceto Acetanilide	48.00
Aniline Oil (HOC)	47.00
Benzoate Plasticiser	62.00
Butyl Acrylate	85.00
Butyl stearate	38.00
Butanol	34.00
Benzyl Alcohol	60.
Benzyl Chloride	34.
Benzo trichloride	16.
Benzoyl chloride	22.
Bromine Liquid	68.
Chloroform	30.
Carbon Tetrachloride	20.
Cellosolve	65.
Cyclohexanone	64.
Cyclohexanol	58+S
Diacetone (Resale)	26.
Diethyl Oxalate	34.
Diethyl glycol (DEG) (Resale)	38.
Dioctyl Phthalate	60.
Diallyl Phthalate	44.
Dimethyl Phthalate	48.
Dioctyl Adipate	58.
Dibutyl Adipate	42.
Dipentene	15.
Dimethylamine 40%	30.
Dimethylamine 50%	35.
Ethyl Acetate	22.
Ethyl Acrylate	70.
Ethylene Dichloride	18.
Ethylene Glycol	38.
Formic Acid (Imp.)	24.
Formaldehyde (Resale)	7.
Glycerine (CP)	48.
Glycerine (IW)	55.
Hydrogen Peroxide 50% (Resale)	34.
Isopropyl Alcohol	38.
Isobutyl Alcohol (Resale)	35.
Monoethanolamine (Resale)	105.
Melamine	62.
Methyl Ethyl Ketone	100.
Methyl Isobutyl Ketone	42.
Methyl Acrylate	72.
Methylene Dichloride (Resale)	21.

Carbitol	75.00 + ST
Meta Cresol	45.00
Nitrobenzene	22.00
Nitric Acid (Conc.) (RCF)	2.50
Octanol	48.00
Ortho Cresol	30+ST
Phenol (Resale)	44.00
Propylene Glycol	54.00
Polyethylene Glycol (No.200)	75.00
Polyethylene Glycol (No.400)	75.00
Polyethylene Glycol (No.500)	52.00
Polyethylene Glycol (No.1600)	54.00
Polyethylene Glycol (No.4000)	95.00
Polyethylene Glycol (No.6000)	85.00
Para Cresol	120.00
Styrene Monomer	51.00
Sorbitol	14.00
Sulphuric Acid	2.80
Trichloroethylene	26.00
Triethanolamine (Resale)	95.00
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	20.00
Vinyl Acetate Monomer	55.00

SOLVENTS	Per Litre
Benzene	14.00
N-Heptane	10.50
N-Hexane	11.00
Methanol	9.25
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	16.50
Xylene	31.00

DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)	
Alphanaphthylamine	67.00
Alpha Naphthol (Imp.)	170.00
Aceto Acetic Ester (Methyl)	95.00
Ammonium Molybdate	250.00
Anthraquinone	155.00
Anthranilic Acid	100.00
2-Amino 4-Nitrophenol	140.00
Blue B. Base (Local)	330.00
Beta Naphthol (Atul)	64.00
Benzidine Dihydrochloride (BDH)	90.00
Bromamine Acid	540.00
BON Acid (Incl. of excise)	150.00
Chicago Acid (Atul)	340.00
Coach Acid	58.00
C. Acid (Imp.)	195.00
Cyanuric Chloride	165.00
2,4- DNCB	33.00
Dihydrothio PTOS (Imp.)	1,600.00
Dimethyl Aniline	65.00
Diethyl Aniline	125.00
Diamino stilbene disulphonic acid	165.00
3,3-DCB	215.00
Gamma Acid (Atul)	165.00
Gamma Acid (Local)	140.00
H. Acid (Atul)	145.00
G. Salt	60.00
J. Acid	330.00
J. Acid Urea	460.00
K. Acid	105.00
MPDS (German)	190.00
MNA	120.00
Meta Ureido Aniline	175.00
MPD (Local)	185.00
MPD (German)	190.00
Naphthenic Acid	46.00
N-Methyl J. Acid	510.00
N-Methyl Aniline	125.00
Naphthalene (Refined)	24.00
Ortho Anisidine (OA) (Imp.)	120.00
Ortho Dichloro Benzene (ODCB)	18.00
OT Base	145.00
Para Dichloro Benzene (PDCB)	32.00
Para Anisidine (PA local)	145.00
PNA	110.00
Para Cresidine (Imp.)	325.00
Para Amino Azo Benzene (India)	135.00
PNCB (HOC)	53.00
Para Amino Acetanilide	195.00
1-Phenyl 3-Methyl 5-Pyrazolone	142.00
Phenyl J. Acid	370.00
Para Amino Benzoic Acid	125.00
PT Base	133.00
Rhoduline Acid	550.00
Resist Salt 80%	30.00
Resorcinol	300.00
Sodium Naphthionate	67.00
5-Sulpho-Anthranilic Acid	105.00
Sulphanilic Acid	35.00
Sulpho Tobias Acid	140.00
Trichloro Benzene (TCB)	28.00
Tobias Acid (Imp.)	130.00
Metanilic Acid	42.00
MTD (German)	130.00

Bombay Drugs Market

(Prices as on December 5, 1990)

Product	Rs./kg.	Product	Rs./kg.	Product	Rs./k
Acriflavine DPC	850.00	Disodium Hydrogen Citrate	43.00	Niacin	200
Aluminium Hydroxide IP	45.00	Ephedrine HCL	1850.00	Niacinamide	230
Ampicillin Trihydrate	1800.00	Erythromycin Estolate	2400.00	Nifedipine	1050
Aminophylline	360.00	Erythromycin Stearate	2150.00	Nitrofurazole	280
Albendazole	2000.00	Ethambutol IP	875.00	Oxyphenbutazone	800
Analgin	280.00	Ethophylline	650.00	Papaverine HCl	2000
Aspirin IP	90.00	Ferrous Fumarate	41.00	Paracetamol	165
Atenolol	2800.00	Folic Acid IP	2800.00	Pectin IP	425
Benzoic Acid IP	34.00	Furosemide IP	2200.00	Pepsin 1:3000	375
Bromine	70.00	Furazolidone IP	385.00	Phenbarbitone	510
Bromhexine HCL	2400	Guanidine Nitrate	40.00	Pheniramine Maleate	1500
Butylated Hydroxy Toluene	650.00	Gallic Acid	320.00	Phenyl Butazone USP	550
Caffeine Citrate IP	390.00	Haloperidone	19,000.00	Piperazine Citrate	110
Caffeine IP	410.00	Hematropine Methyl Bromide	12.00	Piperazine Hexahydrate	100
Calcium Gluconate IP	45.00	Hydrazine Hydrate	92.00	Potato Starch	65
Calcium Glycerophosphate	180.00	Ibuprofen IP	350.00	Propanolol HCl	1250
Calcium Lactate	40.00	Indomethazine	850.00	Pseudoephedrine HCL	2200
Calcium Phenthonate	680.00	I.N.H.	280.00	Pyrazinamide	1200
Cetrimide IP	210.00	Inosite IP	900.00	Ranitidine	2800
Chloramphenicol Powder	1900.00	Iodochloro Hydroxyquinoline	550.00	Rifampicin IP	3900
Chlorbutol	95.00	Lactose IP	40.00	Saccharine Sodium	250
Chlorhexidine Gluconate 20% BP	225.00	Lactic Acid	90.00	Salbutamol Sulphate	7300
Chloroquin Phosphate	830.00	Levamisole	1525.00	Sodium Iodide	425
Chlorpromazine HCL	1500.00	Lignocaine HCl	350.00	Sodium Methoxide	100
Choline Chloride FG	42.00	Lignocaine Base	350.00	Sorbitol Powder	115
Choline Chloride IP	70.00	L. Lysine Feed	95.00	Sorbitol USP	18
Cloxacillin Sodium	2300.00	L. Lysine Pharma	300.00	Sulphacetamide	300
Cimetidine	2100.00	Magnesium Hydroxide	30.00	Sulphamethoxazole	325
Citric Acid IP	45.00	Magnesium Trisilicate IP	12.00	Tinidazole	375
C.P. Maleate	1050.00	Mannitol USP	110.00	Theophylline Anhydrous	370
Cyproheptadine Tcl	9500.00	Mebendazole	620.00	Thiacetazone	290
Diazepam	800.00	Mercurochrome NF	280.00	Tolbutamide	200
Dicyclomine HCl	1450.00	Methyl Chloroformate	85.00	Trimethoprim IP	1050
Diethyl Carbamazine Citrate	300.00	Metochlopromide TCL	2200.00	Vitamin A Palmitate	3100
Di-iodohydroxyquinoline	500.00	Metronidazole IP	450.00	Vitamin B6 Hydrochloride	1450
Diloxanide Fumarate IP	570.00	Morpholine	115.00	Vitamin B2 5-Phosphate	4100
Diphenhydramine HCL	260.00				

Delhi Market

DELHI: DECEMBER 7: NNS Following Gulf crisis coupled with poor import of raw material, the production of boric acid technical had been adversely affected and as a result of poor supply its prices in the local market recorded a rise of Rs. 300 at Rs. 2,400 per 50 kg. Imposition of President's rule in Assam and the State having been declared as a disturbed area and as a result of combing operation by the Army to curb the activities of ULFA, the production in the refineries suffered a setback, consequently paraffin wax jumped up by Rs. 60 at Rs. 1,260 per 50 kg. Residue and slack wax also moved up by Rs. 200 each at Rs. 6,200 and Rs. 13,200 per tonne respectively. Consumers support was reported to be better. Following poor arrivals from Sambhal, Rampur, Barabanki, Chandausi, Amroha and Moradabad areas of U.P. coupled with better support from Maharashtra, M.P. and by local traders, menthol flake, medium and bold jumped up by Rs. 8/10 at Rs. 293, Rs. 310 and Rs. 325 per kg respectively. Mentha oil also recorded a rise of Rs. 10 at Rs. 210 per kg on better consumer support. DMO was reported to be selling at Rs. 82 per kg against Rs. 80. Ammonia bicarb registered a rise of Rs. 20 at Rs. 215 per 25 kg following poor arrivals coupled with better support from bakeries. As a result of poor supply from Kerala, coupled with better demand, prices of titanium dioxide RC-822 moved up by Rs. 3 at Rs. 87 per kg. RCR-2 titanium remained firm at its previous closing of Rs. 90 per kg while TTP titanium suffered a loss of Re. 1 at Rs. 62 per kg on poor support from paint units. K-brand titanium also drifted lower by Re. 1 at Rs. 58 per kg.

Following poor consumers support, citric acid suffered a loss of Rs. 25/50 at Rs. 2,250/2,425 per 50 kg. As a result of heavy arrivals in the market coupled with poor offtake, chatkolite slipped by Rs. 1.50 at Rs. 64.50 per kg. Following poor support from the gur manufacturers of U.P. sodium hydrosulphite Damosha and Kalali slipped by 50 paise at Rs. 49.50 and Rs. 50.50 per kg. Gulshan and Tamil Nadu hydro remained firm at Rs. 46 and Rs. 47 per kg. Rangolite Germany was quoted at Rs. 100 per kg following poor consumers suppport.

(DELHI MARKET RATES AS ON DECEMBER 7, 1990)

Ammonia Bicarb (Per 25 Kg.)	215.00
Mercury (Per flask)	11,000.00
Soda ash (Per bag)	375/385.00
Ammonium Chloride (50 Kg.)	140/180.00
Caustic soda flakes (50 Kg.)	575.00
Citric acid (Per 50 Kg.)	2,250/2,425.00
Stable Bleaching Powder Shriram (Per 25 Kg.)	101.00
Stable Bleaching Powder KCl (Per 25 Kg.)	90.00
Stable Bleaching Powder Maruti (Per 25 Kg.)	91.00
Stable Bleaching Powder Modi (Per 25 Kg.)	92.00
Sodium Bicarbonate (50 Kg.)	325/350.00
Sodium Hydrosulphite (Per Kg.)	46/50.50
Rangolite (Per Kg.)	100.00
Tartaric acid France (Per Kg.)	314.00
Sufolite (Per Kg.)	71.00
Chatkolite (Per Kg.)	64.50
DMO (per Kg.)	82.00
Boric acid Technical (Per 50 Kg.)	2,400.00
Paraffin Wax (Per 50 Kg.)	1,260.00
Slack wax (Per metric tonne)	13,200.00
Tartaric Acid (France Per Kg.)	314.00
Tartaric Acid (Swastik Per Kg.	210.00
Borax Granular (Per 50 Kg.)	950.00
Borax Crystal (Per 50 Kg.)	950.00
Sodium Nitrite (Per 50 Kg.)	875/1,000.00
Sodium Nitrate (Per 50 Kg.)	520.00
Camphor Thal (Per Kg.)	115.00
Camphor Powder (Per Kg.)	102.00
Menthol Bold (Per Kg.)	325.00
Menthol Medium (Per Kg.)	310.00
Menthol Flake (Per Kg.)	293
Mentha Oil (Per Kg.)	210
Glycerine (Per Kg.)	53/56
Sodium Silicate (Per quintal)	300/400
Hexamine (Per Kg.)	34
Acetic Acid Glacial (Per Kg.)	17
Copper Sulphate (Per quintal)	2,400/2,6
Formic Acid (Per Kg.)	25
Formaldehyde (Per Kg.)	8
Hydrogen Peroxide (Per Kg.)	32.00/34
Calcium Carbonate (Per Tonne)	2,800/5,8
Acid Slurry Soft (Per Kg.)	42
Acid Slurry Hard (Per Kg.)	35
Phosphoric Acid (Per 50 Kg.)	1,475
Potassium Nitrate (Per quintal)	1,100/1,300
Potassium Permanganate (Per 50 Kg.)	2,600/3,000
Sodium Bichromate (Per 50 Kg.)	1,600
Trisodium Phosphate (50 Kg.)	700
Titanium Dioxide Anatase T.T.P. (Per Kg.)	62
Titanium Dioxide RC-822 (Per Kg.)	87
Titanium Dioxide Anatase K-Brand (Per Kg.)	58
Titanium Dioxide RCR-2 (Per Kg.)	8
Zinc Oxide (Per Kg.)	46.00/5
Phenol Carbolic Acid (Per Kg.)	4
Carbon Tetrachloride (Per Kg.)	2
Chloroform (Per Kg.)	2
Sodium Sulphate (Per metric tonne)	4,150/4,50
Naphthalene Balls (Per 50 Kg.)	1,50
Match Wax	
Residue Wax	6,20

DYES & COLOURS	(Per
Naphthol AS	175/21
Naphthol ASG	180/24
Naphthol ASBS	210/26
Naphthol ASTR	300/3
Naphthol ASOL	210/25
Naphthol ASBO	195/2

DIRECT DYES	(Per
Black E. Conc.	120/1
Diazo Black B.T.	105/1
Green B	90/1
Blue 2-B	60/1
Blue 2-B 225% (JNR)	1
Sky Blue FB	160/2
Basic Auramine	55/1
Basic Rhodamine	315/4
Basic Methylene Blue	100/1
Basic Violet	165/2
Basic Malachite Green	1
Acid Orange	75/1
Congo Red H/C	85/1

Madras Market

Markets were not enthusiastic. er an initial spurt in the prices of monium bicarbonate, the prices bilised at Rs. 170 per bag of 25 s. Caustic prices ruled firm at . 11,200 to Rs. 11,000 per MT.

MEK continues to be in short supply and the prices rate high. There is no change in the prices of soda ash and other solvents. There were many enquiries for DEG, the stocks of which have not reached Madras.

(MADRAS MARKET RATES AS ON DECEMBER 8, 1990)

etic Acid Glacial (per kg)	15.50
minium Sulphate Iron free (per MT)	4,000.00
monium Bicarbonate (per 25 kgs)	175.00
monium Chloride (per MT)	3,000.00
id Slurry (per kg)	35.00
rium Carbonate (per kg)	10.00
rium Chloride (per kg)	9.00
ric Acid Technical (per kg)	28.00
eaching Powder (per 50 kgs)	220.00
rax (per 50 kgs)	800.00
ustic Soda Flakes -- Mettur Chemicals (per MT)	11,200.00
ustic Soda Flakes -- Andhra Sugars (per MT)	11,200.00
alcium Chloride 70% Solid (per MT)	3,500.00
alcium Chloride Anhydrous (per MT)	6,000.00
alcium Carbonate (Activated) (per MT)	7,000.00
alcium Carbonate (Precipitated) (per MT)	6,000.00
tric Acid (per kg)	48.00
opper Sulphate (per kg)	25.00
resylic Acid 98-99% (per kg)	140.00
ure Para Cresol 96% (per kg)	110.00
eta Para Cresol 42% (per kg)	55.00
rmic Acid (per kg)	27.00
rmaldehyde (per kg)	8.00
lue Flakes (per kg)	15.00
lycerine I.W. (per kg)	49.00
ydrosulphite of Soda (TCPL) (per kg)	42.00
ydrosulphite of Soda (IDI) (per kg)	45.00
Hydrosulphite of Soda (BASF) (per kg)	46.00
Hexamine (per kg)	35.00
Hyflosupercell (per kg)	28.00
Hydrogen Peroxide (per kg)	38.00
Litharge (per kg)	42.00
Lead Acetate (per kg)	40.00
Magnesium Carbonate (per kg)	16.00
Magnesium Chloride (per kg)	4.00
Maleic Anhydride (per kg)	40.00
Menthol Crystals (per kg)	400.00
Oxalic Acid (per kg)	17.00
Paraffin Wax (per kg)	26.00
Potassium Bichromate (per kg)	40.00
Phosphoric Acid (per kg)	32.00
Polyvinyl Alcohol Powder (per kg)	150.00
Pentaerythritol (per kg)	55.00
Phthalic Anhydride (per kg)	48.00
Soda Ash (TAC) (per 75 kgs)	380.00
Soda Ash (TATA) (per 75 kgs)	410.00
Sodium Bicarbonate (TATA) (per 50 kgs)	390.00
Sodium Silicate (per MT)	4,500.00
Sodium Bichromate (per kg)	35.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	24.00
Sodium Sulphide Flakes (per kg)	20.00
Sodium Bisulphite (per kg)	8.00
Sodium Alginate (per kg)	300.00
Sodium Acetate (per kg)	8.00
Sodium Sulphate (Anhydrous) (per kg)	4.20
Titanium Dioxide (Anatase) (per kg)	65.00
Titanium Dioxide (Rutile) (per kg)	85.00
Trisodium Phosphate (per kg)	10.00
Urea (Technical) (per kg)	3.00
Zinc Oxide (per kg)	54.00
Zinc Chloride Powder (per kg)	14.00
Zinc Sulphate (per kg)	9.00

SOLVENTS

Acetone -- HOCL (per kg)	23.00
Butanol (per kg)	39.00
Butyl Acetate (per kg)	39.00
Benzene (per lit)	17.00
Cellosolve (per kg)	65.00
Carbon Tetra Chloride (per kg)	22.00
Chloroform (per kg)	28.00
Diacetone Alcohol (per kg)	34.00
Diethylene Glycol (per kg)	42.00
Dichloroethane (per kg)	20.00
Di-octyl Phthalate (per kg)	65.00
Di-N-butyl Phthalate (per kg)	65.00
Ethyl Acetate (per kg)	25.00
Isopropyl Alcohol (per kg)	33.00
Methanol (per kg)	12.00
Methylene Chloride (per kg)	23.00
Methyl Ethyl Ketone (per kg)	80.00
Methyl Isobutyl Ketone (per kg)	48.00
Phenol (per kg)	46.00
Sorbitol (per kg)	15.00
Triethanolamine (per kg)	100.00
Trichloroethylene (per kg)	26.00
1-1-1 Trichloroethane (per kg)	29.00
Turpentine (per lit)	16.00
Toluene (per lit)	18.00
Xylene (per lit)	30.00

CALCUTTA MARKET (Prices as on Dec. 9, 1990)

Acetic acid (per 50 kg)	725.00
Basic chrome sulphate (per 50 kg)	850.00
Benzene (litre)	14.00
Bleaching powder (bag)	230.00
Borax granular (per 50 kg)	NA
Boric acid (per 50 kg)	1,700.00
Camphor (per kg)	107.00
Caustic soda solid	NA
Caustic soda flakes (per 50 kg)	575.00
Glycerine (per kg)	52.50
Menthol bold (per kg)	350.00
Menthol medium (per kg)	325.00
Menthol small (per kg)	275.00
Phosphoric acid (per 50 kg)	1,400.00
Phenol (per kg)	42.00
Soda ash (75 kg)	395.00
Sodium bichromate (per 50 kg)	3,250.00
Sodium bicarbonate (per 50 kg)	375.00
Sodium nitrate (per 50 kg)	450.00
Sodium sulphate anhydrous (per 50 kg)	NA
Sulphuric acid (per ton)	2,200.00
Trisodium phosphate (per 50 kg)	375.00
Toluene (litre)	18.00

Shipping News

VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	Appro sailing (5)
20/12	Prospect	Killick	S. American Ports. (Carting at Hay Bunder No. 5).	24/12
14/12	Ahelers Breeze (Voy-911)	Marine Trans/	Boston; New York; Baltimore; Norfolk; Charleston; Port Everglades; Jacksonville; Galveston; Houston; Los Angeles; Toronto; Montreal; Philadelphia; Savannah; New Orleans; South & Central American Ports. (Carting at T.P. No. 3).	19/12
		Ranadip/	NewYork; (Elisabeth); Portsmouth (Norfolk); Baltimore; Charleston; Boston; Philadelphia; Houston; New Orleans; Jacksonville; Savannah; Wilmington (N.C.); Mobile; P. Everglades; (Miami); Los Angeles; (Long Beach); Oakland; Portland; Seattle; Anchorage; Montreal; Qubec; Ontario; Toronto; Via Halifax; Vancouver; Detroit Also Carobbean & Mexican Ports. (Carting at M.O.D. No. 2).	
		M.C.S./	Savannah; New York; Baltimore; Wilmington; Houston; Galveston; Los Angeles; Longbeach; Boston; Norfolk; Charleston; Jacksonville; Miami; Tampa; New Orleans; Providence; San Diego; Oakland; San Francisco; Stockton; Chicago; Detroit; Cleveland; Milwaukee; Columbus; Kansas City; Atlanta; Nashville; Dallas; Minneapolis. (Carting at E-Grain Depot).	
		Arebee	Halifax; Montreal; Toronto; Los Angeles; Oakland; San Francisco; San Diego; New York; Baltimore; Boston; Charleston; Chicago; Dallas; Houston; Jacksonville; Miami; Norfolk; Philadelphia; Savannah; San Juan; Tijuana; Carribbean & Central American Ports. (Carting at M-Jetha C.D.).	
22/12	CMB Merzario (Nhava Sheva)	C.M.B.	Norfolk; New York; Baltimore; Phialdelphia; Charleston; Savannah; Houston; Miami; New Orleans Via Antwerp; Montreal; Toronto; Halifax. (Carting at Kalamboli).	24/12
19/12	Lanka Aruna	Seahorse	New York; Baltimore; Charleston; Norfolk. (Carting at M.O.D. No. 3).	23/12
17/12	Susak (V-10/90)	Oceanic	New York; Baltimore; Phialdelphia; Chicago; Boston; Norfolk; Atlanta; Charleston; Savannah; Miami; Houston & Other inland destinations in U.S. East Coast & S. American Ports. (Crtg. at Wadi Bunder No. 3).	20/12
14/12	Maersk Clementine (Voy-9024)	Maersk Agency	New York; Philadelphia; Baltimore; Norfolk; Charleston; Savannah; Jacksonville; Miami; New Orleans; Houston; Toronto; Montreal; Chicago; Atlanta; Denver; Dallas; Wilmington; Milwaukee; Detroit; Minneapolis; Memphis; Nashville; Cleveland; Phoenix; Boston; Los Angeles; Vancouver; Seattle; San Francisco; Portland; Long Beach; Mexican & S. American Ports. (Carting at 19-ID).	19/12
12/12	Ocean Sincerity (V-29A/B)	O.S.A.	New York; Baltimore; Philadelphia; Houston; Boston; Chicago; Dallas; Atlanta; Savannah; Norfolk; Charleston; Los Angeles; San Francisco; Oakland; Seattle; Vancouver; Toronto; Montreal; Portland; Tacoma & S. American & W. Indies Ports. (Carting at B. Pier Extn.)	20/12
14/12	Contship Asia	Samrat/ Hindustan/ L. Trest	Boston; New York; Baltimore; Norfolk; Charleston; P. Mouth; P. Lauderdale; Miami; New Orleans; Savannah; Jacksonville; P. Everglades; Philadelphia; Halifax; Montreal; Toronto & S. American Ports. (Carting at M.O.D. No. 1 for Samrat & Hindustan) (Carting at M-171/173 C.D. for L. Triest).	20/12
22/12	Hoegh Clipper (Bahamas)	Patvolk	Montreal & Toronto Via Halifax; New York; Boston; Norfolk; Charleston; Houston; Savannah; Wilmington; Philadelphia; Baltimore; New Orleans; & FCL Chicago; Milwaukee; Atlanta; Dallas. (Carting at H.B. No. 5).	27/12
22/12	CMB Merzario (Nhava Sheva)	C.M.B.	Lagos; Abidjan; Lome; Douala; Matadi; Port. Gentil; Pointe Noire; Nouakchott; Cotonou; Dakar; Luanda; Monrovia; Tema via Antwerp. (Carting at Kalamboli).	24/12
25/12	Menkar (Cyp) (Voy-010)	Arebee	Lagos/Apapa; P. Harcourt; Abidjan; Tema; Takoradi; Lome; Freetown; Cotonou; Douala; Matadi. (Carting at M-178/180 Cotton Depot).	29/12
14/12	Contship Asia	L. Triest	With T.P. Lagos/Apapa; Abidjan; Dakar; Douala; Cotonou; Nouakchott; Libreville; Matadi; Conakry; Freetown. (Carting at M-171/173 Cotton Depot).	20/12

(2)	(3)	(4)	(5)
2 Ahlers Breeze (V-911) (Belg)	Marine Trans/	Antwerp; Rotterdam; Hamburg; Bremen; Le Havre; Felixstowe; Hull; Rostock; London; Liverpool; Avonmouth; Copenhagen; Gothenburg; Aarhus; Oslo; Stockholm; Helsinki; Malmao; Norkopping; Helsinburg; (including inland destinations for above ports); Lattakia; Mimmassol; Izmir; Mersin; Istanbul; Beirut; Quzai; Marseilles; Valencia; P. Said; Casablanca; Alexandria; Piraeus; Soloniki; Iraqi Ports. (Carting at T.P. No. 3).	19/12
	M.C.S./	Jeddah; Genoa; Felixstowe; Hamburg; Rotterdam; Antwerp; Le Havre; Gdansk; Lisbon; Aarhus; Copenhagen; Gothenburg; Oslo. (Carting at E-Grain Depot).	
	Ranadip/	Jeddah; Palermo; Naples; Livorno; (Leghorn); Marseilles (Fos); Barcelona; Bilbao; Valencia; Alicante; Algeciras; Lisbon; Leixoes; Bremerhaven; Le Havre; Antwerp; Rotterdam; Bremen; Hamburg; Aarhus; Piraeus; Gothenburg; Oslo; Copenhagen; Stockholm; Helsinki; Felixstowe; Tilbury; London; Avonmouth; Dublin; Belfast; Grangemouth; Liverpool; Manchester; Istanbul; Izmir; Valetta; (Malta). (Carting at M.O.D. No. 2).	
	Patvolk/	Genoa; Marseilles; Le Havre; Antwerp; Rotterdam. (Crtg. at HB No. 4).	
	L. Triest/	Barcelona; Marseilles. (Carting at M-171/173 Cotton Depot).	
	Mackintosh/	Aqaba; Hodeidah; Aden; Jeddah. (Carting at T.P. No. 4).	
	Arebee	P. Said; Alexandira; Piraeus; Venice; Trieste; Genoa; Koper; Naples; Fos; Marseilles; Bacelona; Valencia; Ravenna; Livorno; Las Palmas; Limmasol; Constanza; Budapest. (Carting at M-178/180 Cotton Depot).	
12 Menkar	P&O	Assab; Djibouti; P. Sudan. (Carting at Timber Pond No. 1).	29/12
12 Susak (Yug)	Oceanic/	Jeddah; P. Said; Rijeka; Trieste; Venice; Med. Ports. (Crtg. at W.B. 3) No. 3).	20/12
	L. Triest	Trieste; Venice; Ravenna; Rijeka; Koper; Ancona. (Carting at M-171/173 Cotton Depot).	
/12 Lanka Aruna (Phi)	Seahorse	Felixstowe; London; Liverpool; Manchester; Avonmouth; Dublin; Glasgow; Wembley; Leicester; Immingham; Birmingham; Leeds; Antwerp; Bremen; Copenhagen; Gothenburg; Hamburg; Rotterdam; Oslo; Stockholm; Helsinki; Aarhus; Malmao; Norkopping. (Carting at M.O.D. No. 3).	23/12
/12 Maersk Clementine	Maersk Agency	Leghorn; Marseilles; Naples; Barcelona; Bilbao; Bordeaux; Alicante; Genoa; Valencia; Bremen; Jeddah; Antwerp; Rotterdam; Bremerhaven; Hamburg; U.K. & Scandinavian Ports. (Carting at 19-ID).	19/12
/12 CMB Merzario (Nhava Sheva)	C.M.B./ Merzario	Port Sudan; Jeddah; La Spezia; Valencia; Genoa; Barcelona; Marseilles; Tunis; Casablanca; Tangier; Alexandria; Piraeus; Mersin; Limmassol; Felixstowe; London; Liverpool; Manchester; Birmingham; Avonmouth; Dublin and all inland destinations in U.K.; Antwerp; Rotterdam; Hamburg; Bremen; Leixoes; Lisbon; Copenhagen; Oslo; Gothenburg; Stockholm; Malmao; Aarhus; Helsinki. (Crtg. at Kalamboli for both).	24/12
/12 Contship Asia (Ger)	Samrat/ Hindustan/	Felixstowe; Hamburg; Rotterdam; Also London; Liverpool; Leixoes; Lisbon; Manchester; Avonmouth; Wembly; Birmingham; Leicester; Le Havre; Bremen; Amsterdam; Antwerp; Copenhagen; Leeds; Aarhus; Gothenburg; Oslo; Helsinki; Stockholm; Belfast & all destination in U.K., Benelux; Germany; France; Switzerland and Austria; Barcelona; Marseilles; La Spezia; Livorno; (Leghorn); Genoa; and other Italian ports and FCL only Beirut; Alexandria; Valletta; Limmassol; Larnaca; Lattakia; Mersin; Izmir. (Carting at M.O.D. No. 1 for Samrat & Hindustan).	20/12
	Killick/	Felixstowe; Rotterdam; Hamburg; Antwerp; Le Havre; Lisbon; Leixoes; London; Liverpool; Manchester; Bristol; Avonmouth; Leeds; Glasgow; Tilbury; Birmingham; Dublin; Belfast; Bremen; Bremerhaven; Aarhus; Copenhagen; Gothenburg; Helsinborg; Oslo; Helsinki; Alexandria; Lattakia; Mersin; Malta; Limmassol; Piraeus. (Carting at E-Shed Grain Depot).	
	L. Triest	Felixstowe & U.K. Inland Destinations; Hamburg; Rotterdam & Inland Destinations in Cont; Genoa; Leghorn; La Spezia; Naples; with TP Las Palmas; Santacruz; De Teneriffe; Malta; Limmassol; Alexandria; Tunis; Benghazi. (Carting at M-171/173 Cotton Depot).	
/12 Moscenice	Oceanic	Jeddah; P. Said; Rijeka	28/12
/12 Menkar	P&O	Colombo; Chittagong. (Carting at T.P. No. 1).	29/12

(1)	(2)	(3)	(4)	(5
19/12	Lanka Aruna	Seahorse	Colombo. (Carting at M.O.D. No. 3).	23/
22/12	CMB Merzario	Links Int.	Afghanistan. (Carting at Kalamboli).	24/
20/12	Prospect	I.M.E./Killick/ P&O	Singapore. (Carting at W.B. No. 3 for I.M.E.) (Carting at H.B. No. 5 for Killick) (Carting at T.P. No. 1 for P&O).	24/
14/12	Maersk Clementine	Maersk Agency	Penang; Singapore; Hongkong; Keelung; Kaohsiung; Busan; Main Japan Ports; Manila; Jakarta; Surabaya; Bangkok; P. Kelang; Chinese Ports. (Carting at 19-ID).	19/
14/12	Ahlers Breeze	Marine Trans/ M.C.S./ Ranadip	Singapore; Hongkong; Busan; Kobe; Tokyo; Djakarta. (Crtg. at T.P. 3). Far East & Japan Ports. (Carting at E-Grain Depot). Far East & Japan Ports. (Carting at M.O.D. No. 2).	19/
19/12	Lanka Aruna	Seahorse	Singapore; Penang; P. Kelang; Bangkok; Hongkong; Keelung; Kobe; Yokomama & FCL only Busan; Inchon; Osaka; Tokyo; Nagoya; Kaohsiung. (Carting at M.O.D. No. 3).	23/
12/12	Ocean Sincerity (V-29 A/B) (Lib)	O.S.A./	P. Kelang; Singapore; Kaohsiung; Hongkong; Bangkok; Kobe; Yokohama; Nagoya; Moji; Osaka; Busan; Tokyo; Shimizu; Keelung; Tsingtao; Quindao; Xiangang; Shanghai. (Carting at B. Pier Extn.).	20/
		M.S.P.L.	Singapore; Bangkok; P. Kelang; Penang; Jakarta; Ho Chi Minh; Kaohsiung; Busan. (Carting at E-Shed Grain Depot).	
11/12	Nikolay Semashko	Transocean	Singapore; Main Japan Ports.	21/
20/12	Prospect (V-9) (Phi)	I.M.E./	Sydney; Melbourne; Adelaide; Fremantle; Brisbane; Auckland; Wellington; Lyttelton. (Carting at Wadi Bunder No. 3).	24/
		Killick/ P&O	Melbourne; Sydney; Brisbane; Adelaide; Fremantle; P. Hobart; Devon P.; Launceston; Burnie; New Plymouth; Auckland; Wellington; Lyttelton; P. Chalmers; Christchurch; Dunedin; Napier; Also Western Samoa; Papua; New Guinea; Soloman Island; American Samo; Tonga; New Calidonia; P. Villa. (Carting at Hay Bunder No. 5 for Killick) (Carting at Timber Pond No. 1 for P&O).	
14/12	Ahlers Breeze	M.C.S.	Sydney; Melbourne; Brisbane; Burnie; New Castle. (Crtg. at E-G.D.).	19/
19/12	Lanka Aruna	Seahorse	Brisbane; Fremantle; Sydney; Melbourne; Adelaide. (Crtg. at MOD 3).	23/
12/12	Ocean Sincerity	O.S.A.	Sydney; Melbourne; Adelaide; Brisbane; Fremantle; Auckland; Wellington; Lyttelton; P. Chalmers. (Carting at B. Pier Extn.)	20/
14/12	Maersk Clementine	Maersk Agency	Dubai; Dammam; Muscat; Bahrain; Riyadh; Doha. (Carting at 19-ID).	19/
14/12	Ahlers Breeze	Ranadip	Dubai; Muscat; Abu Dhabi; Doha; Dammam; Bahrain. (Carting at M.O.D. No. 2).	19/
15/12	Saadi (Iranian)	J.M. Baxi	Bandar Abbas.	19/
16/12	Ermioni (Cyp)	Jades Ship	Dubai.	24/
14/12	Bismi	Unimarine	Muscat; Dubai.	21/
15/12	Ghantout One	Sitara	Dammam.	22/
14/12	Kapitan Medvetski	Sai Ship	Mombasa; Dar Es Salaam. (Carting at E-Shed Grain Depot).	20/
25/12	Menkar (V-10) (Cyp)	Arebee/	Dar Es Salaam & Mombasa (Direct); Kampala; Jinja; Torroro; Lugazi; Entebee (Uganda); Kigali (Rwanda); Kitwe; Lusaka; Ndola (Zambia); Lilongwe; Blantyre (Malawi); Maputo; Zanzibar. (Carting at M-178/180 Cotton Depot).	29/
		P&O	Mombasa; Dar Es Salaam (Direct); Beira; Mahe; & Inland Destinations in East Africa. (Carting at Timber Pond No. 1).	
24/12	Vishva Kaumudi	S.C.I.	Seychelles; P. Louis; Mombasa; Dar Es Salaam; (Beira) & Tamatave Via P. Louis.	31/

VESSELS DUE FOR IMPORT DISCHARGE

Due Date	Steamer's Name	Agents	From
19/12	Asean Honour	Swanship	Malaysia
28/12	Bhavabuti	S.C.I.	Black Sea & Med. Ports.
22/12	CMB Merzario (Nhava Sheva)	CMB	U.K., Cont./U.S., Med. Ports.
22/12	Hoegh Clipper	Patvolk	U.S.A.
22/12	Jala Gouri	S.C.I.	Japan/Far East
19/12	Lanka Aruna	Seahorse	U.K. Cont.
20/12	Prospect (V-9)	I.M.E./P&O/Killick	Australia/New Zealand & Gulf
28/12	S/o. Manipur	S.C.I.	U.S. Canada
27/12	Taipan	Parekh	Cont.
22/12	Vishva Parijat	S.C.I.	U.K. Cont./U.S.
30/12	Vishva Tarang	S.C.I.	U.K. Cont.

Materials Imported/Exported

Import values are c.i.f. Export values are f.o.b. port

MATERIALS EXPORTED BOMBAY
(From 19.3.90 To 28.3.90)
(Continued from previous issue)

POTASSIUM NITRATE: To Dubai: 3 Exports, 10,000 Kgs., Rs. 1,24,000.

RED OXIDE: To Daressalaam: ames International, 60,000 Kgs., . 75,000.

SILICON GEL BLUE: To Dubai: 3 Exports, 4,000 Kgs., Rs. 1,60,000.

SODIUM BICARBONATE: To rare: Tata Chemicals Ltd., 18 Mts., . 90,995.

SODIUM CYANIDE: To La Guaira: anides & Chem. Co., 61,930 Kgs., . 19,45,180.

SODIUM HYDRO SULPHITE: To twerp: Transpek Industry Ltd., ,000 Kgs., Rs. 9,44,883; To Charles-: Products and Produce Pvt. Ltd., ,000 Kgs., Rs. 3,40,426; Transpek dustry Ltd., 18,144 Kgs., . 3,52,000; To Izmer: Transpek dustry Ltd., 36,000 Kgs., . 6,18,212; To La Spezia: Transpek dustry Ltd., 3,000 Kgs., Rs. 52,954.

SODIUM HYDROSULPHITE: To twerp: Transpek Industry Ltd., ,000 Kgs., Rs. 9,44,883.

SODIUM HYDROSULPHITE -92%: To Charleston: Transpek dustry Ltd., 18,144 Kgs., . 3,52,000.

SODIUM HYDROSULPHITE 88% N: To La Spezia: Transpek Industry d., 31,200 Kgs., Rs. 5,65,686.

SODIUM NAPTHIONATE: To twerp: Saahil Ind., 5,556 Kgs., . 2,43,829.

SODIUM PENTACHLOROPHE-TE: To Antwerp: Excel Inds. Ltd., 00 Kgs., Rs. 4,88,510.

MONO SODIUM PHOSPHATE: To ngkok: Mangalya Trading & Investment Ltd., 1,000 Kgs., Rs. 30,100.

SULFANILIC ACID: To Bangkok: Sudha Indl. Corpn., 3,000 Kgs., Rs. 66,945; To Busan: Jeevan Products, 10,000 Kgs., Rs. 2,03,744; To Milan: Priya Electronics & Chemicals, 3,000 Kgs., Rs. 57,765.

SULFO ANTHRANILIC ACID: To Bangkok: Vivid Exports, 1,352.95 Kgs., Rs. 86,435; To Keelung: Jay Chemical Inds., 2,949.8 Kgs., Rs. 1,38,000.

META UREIDOANILINE: To Bangkok: Vivid Exports, 1,450 Kgs., Rs. 1,34,413.

VINYL SULPHONE ACETANILIDE: To Busan: Shyam Intermediates, 3,150 Kgs., Rs. 2,76,596; National Organic Chemical Inds., 12,850 Kgs., Rs. 94,177.

VINYL SULPHONE: To Busan: NOCIL, 6,350 Kgs., Rs. 4,96,736.

VITAMIN C BP/USP: To Hamburg: Ambalal Sarabhai Enterprises, 5,000 Kgs., Rs. 7,42,128.

YELLOW OXIDE: To Jeddah: Selective Minchem & Colour Inds., 8,400 Kgs., Rs. 65,459.

ZINC OXIDE: To Singapore: Metaxinc India Ltd., 18,000 Kgs., Rs. 3,69,362.

ZINC PHOSPHIDE TECH 80% MIN: To Bangkok: United Phosphorous Ltd., 5,000 Kgs., Rs. 3,12,670.

DYE MATERIALS EXPORTED BOMBAY
(From 19.3.90 To 28.3.90)

ARYLAMIDE ORANGE: To Colombo: Sudarshan Chemical Ind. Ltd., 200 Kgs., Rs. 37,060; To Hong Kong: Sudarshan Chemical Ind. Ltd., 3,000 Kgs., Rs. 57,251.

ARYLAMIDE YELLOW 52: To Colombo: Sudarshan Chemical Ind. Ltd., 200 Kgs., Rs. 32,610.

ACID BLACK: To Felixstowe: Saurabh Intl., 1,000 Kgs., Rs. 1,14,966.

ACID BLACK 113: To Liverpool: Formokem (India) Corpn., 2,000 Kgs., Rs. 2,45,000.

ACID GREEN 16: To Genoa: Liberty Exports Ltd., 500 Kgs., Rs. 1,55,745.

ACID RED 1: To New York: Priya Electronics & Chem. Ltd., 2,000 Kgs., Rs. 1,53,095.

ACID RED 35: To Keelung: Ravi Chem Dye, 1,000 Kgs., Rs. 96,866.

ACID SCARLET GDL: To Singapore: Golden Dyes Corpn. Pvt. Ltd., 1,500 Kgs., Rs. 72,700.

AMARYL YELLOW 4R: To Colombo: Amritlal Chemaux Ltd., 200 Kgs., Rs. 27,150.

AURAMINE O CONC. ACID BLUE: To Buenos Aires: Ravi Chem Dye, 400 Kgs., Rs. 95,132.

BLACK FBRR: To Singapore: Colour Chem Ltd., 500 Kgs., Rs. 10,774.

BLUE FFG EX. CONC: To Bangkok: Colour Chem Ltd., 200 Kg., Rs. 14,099.

BORDEAUX FRN: To Penang: Colour Chem Ltd., 200 Kgs., Rs. 20,831.

BORDEAUX FRN EX. CONC: To Colombo: Colour Chem Ltd., 150 Kgs., Rs. 7,768.

BORDEAUX GP BASE: To New York: Monarch Dyestuffs Inds., 1,200 Kgs., Rs. 2,05,957.

BRACTOZOL TURQUOISE BLUE G: To Busan: Blue Rock Dyes & Chems. Pvt. Ltd., 1,000 Kgs., Rs. 1,07,234.

BRACTOZOL YELLOW: To Antwerp: Blue Rock Dyes & Chemicals Pvt. Ltd., 3,000 Kgs., Rs. 4,59,573.

BRACTOZOL YELLOW 3RS: To Hong Kong: Blue Rock Dyes & Chem. Pvt. Ltd., 500 Kgs., Rs. 68,085.

CHEMICTIVE YELLOW: To Antwerp: Chemiequip Ltd., 575 Kgs., Rs. 92,979.

CHROMAZOL TURQUOISE BLUE G: To Hamburg: Blue Rock Dyes & Chem Ltd., 1,000 Kgs., Rs. 1,14,043.

DIRECT BLACK 38: To Genoa: Metro Chem Industries, 8,000 Kgs., Rs. 7,82,839.

DIRECT BLUE 2B: To Jakarta: Uni Impex India, 1,500 Kgs., Rs. 71,096.

DIRECT BLUE 86: To Rotterdam: Ravi Chem Dye, 1,500 Kgs., Rs. 1,39,954.

DIRECT BRILLIANT VIOLET: To New York: Indokem Ltd., 3,000 Kgs., Rs. 6,73,958.

DIRECT GREEN B: To Rotterdam: Vilia Chemicals Pvt. Ltd., 1,000 Kgs., Rs. 78,000.

DIRECT GREEN B DIRECT BROWN MR: To Jakarta: Rama Exports, 3,000 Kgs., Rs. 2,33,991.

DIRECT TURQ BLUE: To Rotterdam: Priya Electronics & Chemicals, 1,000 Kgs., Rs. 69,691.

DYE INTERMEDIATES: To Antwerp: Jindal Dye Intermediate Pvt. Ltd., 20,000 Kgs., Rs. 6,26,808; Monarch Dyestuffs Inds., 2,600 Kgs., Rs. 1,36,207; Saahil Intl., 6,424 Kgs., Rs. 2,67,506; To Bangkok: Indian Dyestuff Inds. Ltd., 500 Mts., Rs. 1,94,000; Virton Intermediates Pvt. Ltd., 19,554.64 Kgs., Rs. 15,04,340; To Bremen: BASF India Ltd., 1,000 Kgs., Rs. 3,55,000; To Buenos Aires: Priya Chemicals, 4,200 Kgs., Rs. 4,46,727; To Busan: Aarti Organics Pvt. Ltd., 2,500 Kgs., Rs. 28,100; Gujarat Dyestuff Inds., 9,358.30 Kgs., Rs. 7,37,021; Mangalya Trading & Inv. Ltd., 7,000 Kgs., Rs. 6,65,000; Metro Chem Industries, 3,183.60 Kgs., Rs. 2,79,880; Zenith Ltd., 2,650 Kgs., Rs. 1,74,090; To Felixstowe: Jeevan Products,14,000 Kgs., Rs. 5,91,232; To Hamburg: Jindal Dye Intermediate Pvt. Ltd., 4,112.6 Kgs., Rs. 7,22,211; Liberty Expo Ltd., 15,000 Kgs., Rs. 3,45,691; Pr Chemicals, 1,900 Kgs., Rs. 1,58,6 Priya Electronics & Chemicals, 3,2 Kgs., Rs. 22,385; To Jakarta: Esp Chemicals, 5,300 Kgs., Rs. 4,54,8 1,350 Kgs., Rs. 1,08,843; Goodw Chemical Inds., 18,000 Kg Rs. 4,29,632; Hub Dyes & Chem P Ltd., 10,695 Kgs., Rs. 9,82,979; Istanbul: Jindal Dyes & Intermedi Pvt. Ltd., 15,394.9 Kgs., Rs. 7,37,62 To Istanbul: Sajan Impex Pvt. Lt 15,000 Kgs., Rs. 11,70,953; To Kol Metro Chem Industries, 7,534 Kg Rs. 5,58,889; Monarch Dyestuffs Inc 3,024 Kgs., Rs. 62,979; to Keelun Priya Chemicals, 2,650 Kg Rs. 2,32,486; Vivid Exports, 2,314. Kgs., Rs. 1,66,280; To Leeds: Sand (I) Ltd., 3,750 Kgs., Rs. 4,62,128; London: Sate Chem Pvt. Ltd., 3613.2 Kgs., Rs. 3,73,130; To Manchest Sadhana Nitrochem Ltd., 5,000 Kg Rs. 1,28,210; To Milano: Priya Ele tronics & Chemicals, 6,400 Kg Rs. 4,37,553; To New York: Ac Chemical, 16,000 Kgs., Rs. 10,48,0 Atul Products Ltd., 11,500 Kg Rs. 10,37,174; To Nagoya: R.D. Ent prises, 5,000 Kgs., Rs. 1,35,000; New York: Textile Auxilaries & Che ical, 990 Kgs., Rs. 1,30,042; Visi Intermediates Pvt. Ltd., 16042.78 Kg Rs. 13,37,787; To Odessa: Bub Enterprises, 9,484.900 Kg Rs. 18,91,500; Sharda Internation 20,983.900 Kgs., Rs. 27,65,000; Osaka: Metro Chem Inds., 1,087 Kg Rs. 3,88,425; To Singapore: Sum International, 2,500 Kgs., Rs. 2,83,91

DYES: To Antwerp: Jindal D Intermediate Pvt. Ltd., 3,000 Kg Rs. 1,96,861; Monarch Dyestuf Ind 5,000 Kgs., Rs. 3,11,623; Vipul Dyes Chemicals Pvt. Ltd., 1,000 Kg Rs. 1,83,830; To Bangkok: IDI Lt 2,800 Kgs., Rs. 8,04,000; Jay Chem cal Inds., 20,000 Kgs., Rs. 15,87,0 12,300 Kgs., Rs. 24,16,124; Miv Overseas Corpn., 3,000 Kg Rs. 4,11,915; To Buenos Aires: R

hem Dye, 200 Kgs., Rs. 30,125; To usan: Amar International, 5,000 Kgs., s. 51,064; Associated Intermediates & hem., 5,000 Kgs., Rs. 7,40,000; 000 Kgs., Rs. 1,26,000; Mahalaxmi hemical Works, 1,200 Kgs., s. 3,95,745; Monarch Dyestuffs Inds., 000 Kgs., Rs. 1,13,191; Space Intl., 000 Kgs., Rs. 2,37,021; To Bremen: shish Chemicals, 1,000 Kgs., s. 1,61,957; To Charleston: Atul Pro-ucts Ltd., 7,800 Kgs., Rs. 2,30,161; onarch Dyestuff Inds., 12,000 Kgs., s. 11,23,406; To Chicago: Chemie-uip Ltd., 8,000 Kgs., Rs. 8,51,064; 000 Kgs., Rs. 8,59,576; To Chicago: y Chemical Inds., 10,000 Kgs., s. 8,95,000; To Colombo: 1,500 Kgs., s. 1,31,900; Amritlal Chemaux Pvt. d., 1,000 Kgs., Rs. 48,355; To Dubai: ddharth Exports, 960 Kgs., s. 32,300; To Felixstowe: IDI Ltd., 750 Kgs., Rs. 24,24,221; Subashri hemicals Pvt. Ltd., 4,100 Kgs., s. 2,40,000; To Genoa: Chika Ltd., 000 Kgs., Rs. 4,85,319; Karsandas avji, 500 Kgs., Rs. 51,563; Liberty xports Ltd., 5,000 Kgs., Rs. 4,80,962; etro Chem Intl., 5,000 Kgs., s. 5,11,013; To Hong Kong: Atul Pro-ucts Ltd., 1,000 Kgs., Rs. 2,63,336; To ong Kong: Bhoir Import Export Pvt. d., 3,000 Kgs., Rs. 3,07,236; Blue ock Dyes & Chem Pvt. Ltd., 2,000 gs., Rs. 1,94,843; Indokem Ltd., 300 gs., Rs. 43,030; Jay Chemical Inds., 000 Kgs., Rs. 3,00,000; Monarch yestuffs Inds., 1,000 Kgs., . 2,05,957; Space International, 1,275 gs., Rs. 1,76,459; Valia Chemical Pvt. d., 1,000 Kgs., Rs. 2,06,000; To karta: Anil Dyechem Inds. Pvt. Ltd., 000 Kgs., Rs. 4,38,808; Ashish emicals, 6,000 Kgs., Rs. 6,77,361; olden Dyes Corpn., 5,923 Kgs., . 4,91,700; Jaytex Dyes & Chemicals t. Ltd., 1,000 Kgs., Rs. 1,50,000; ungalya Trading & Investment Ltd., 000 Kgs., Rs. 2,82,000; Pearl Enter-ses, 2,000 Kgs., Rs. 1,60,000; To clung: Priya Electronics & Chemi-s, 3,000 Kgs., Rs. 2,26,393; Jay emical Inds., 8,000 Kgs., 12,06,000; Jindal Dye & Interme-diates Pvt. Ltd., 1,000 Kgs., Rs. 1,72,521; To Leinoes: Jaysynth Dyechem Ltd., 500 Kgs., Rs. 1,50,213; To Liverpool: Atic Inds. Ltd., 5,950 Kgs., Rs. 21,42,567; Jindal Dye Intermediates Pvt. Ltd., 3,500 Kgs., Rs. 4,12,600; To London: Devarsons Pvt. Ltd., 1,800 Kgs., Rs. 4,40,000; Ravi Chem Dye, 21,000 Kgs., Rs. 2,01,595; To Mombasa: IDI Ltd., 500 Kgs., Rs. 2,11,000; Jaysynth Dyechem Ltd., 2,500 Kgs., Rs. 5,48,085; To Manila: Space International, 4,000 Kgs., Rs. 2,34,042; To New York: Amritlal Chemaux Ltd., 1,200 Kgs., Rs. 5,45,140; To New York: Atic Inds. Ltd., 5,547.27 Kgs., Rs. 37,68,085; Golden Dyes Corpoartion Pvt. Ltd., 1,000 Kgs., Rs. 2,64,000; Ravi Chem Dye, 12,000 Kgs., Rs. 13,15,531; Uni Impex India, 3,000 Kgs., Rs. 3,52,553; To Odessa: Usha International India, 4.5000 Mts., Rs. 5,67,000; To Osaka: Atic Industries Ltd., 5,212.94 Kgs., Rs. 39,11,461; To Port Kolang: Little & Company, 250 Kgs., Rs. 15,329; Sahyadri Dyestuffs & Chemicals, 475 Kgs., Rs. 1,05,000; To Priok: Uni Impex India, 2,500 Kgs., Rs. 3,43,447; To Rotterdam: Chemie-quip Ltd., 500 Kgs., Rs. 79,285; Chika Ltd., 1,000 Kgs., Rs. 42,963; Formo-kem Corpn., 2,000 Kgs., Rs. 5,20,000; IDI Ltd., 300 Kgs., Rs. 10,700 Karsan-das Mavji, 1,000 Kgs., Rs. 99,639; Mahalaxmi Chemical Works, 1,000 Kgs., Rs. 4,98,926; Mangalya Trading & Investment, 750 Kgs., Rs. 3,24,000; Metro Chem Inds., 12,000 Kgs., Rs. 10,39,745; Monarch Dyes Inds., 7,000 Kgs., Rs. 6,39,780; Navin Chem-ical Enterprises, 10,000 Kgs., Rs. 10,04,820; Valia Chemicals Pvt. Ltd., 2,000 Kgs., Rs. N.A.; To Singa-pore: Atlas Dye-Chem Inds., 4,000 Kgs., Rs. 4,19,638; Bhoir Import Export Pvt. Ltd., 1,000 Kgs., Rs. 1,57,446; Espee Chemicals, 2,127.70 Kgs., Rs. 1,72,630; K. Patel Chemo Pharma Pvt. Ltd., 1,600 Kgs., Rs. 1,55,000; Mivin Overseas 2,000 Kgs., Rs. 1,74,468; To Tilbury: Navin

Chemical Enterprises, 1,000 Kgs., Rs. 2,15,000; To Yokohama: Chemex Works, 2,000 Kgs., Rs. 1,56,595.

FAST BETA BLUE SPL: To Colombo: Colour-Chem Ltd., 675 Kgs., Rs. 48,630.

FAST BLUE CBR: To Colombo: Colour-Chem Ltd., 150 Kgs., Rs. 15,733.

FAST ORANGE CG: To Colombo: Colour-Chem Ltd., 1,000 Kgs., Rs. 11,800.

FAST RED B: To New York: Atul Products Ltd., 6,500 Kgs., Rs. 8,46,638.

FAST RED B BASE: To New York: Monarch Dyestuffs Ltd., 1,000 Kgs., Rs. 1,39,574.

FAST RED B BASE STD: To Charleston: Jansons Intl., 2,000 Kgs., Rs. 2,66,383.

FAST RED F4R 747: To Colombo: Colour-Chem Ltd., 50 Kgs., Rs. 6,646.

FAST RED R BASE: To Kobe: Mahalaxmi Chemical Works, 500 Kgs., Rs. 64,681.

FAST RED TR BASE: To Rotterdam: Vipul Dyes and Chemicals Pvt. Ltd., 7,500 Kgs., Rs. 9,62,000.

FAST YELLOW CG: To Colombo: Colour-Chem Ltd., 1,225 Kgs., Rs. 71,575.

FAST YELLOW DHG SPL: To Harare: The Minerals & Metals Trading Corpn., 1,500 Kgs., Rs. 3,15,319.

FAST SCARLET R BASE: To New York: Toshniwal Exports, 4,192 Kgs., Rs. 5,69,617.

GREEN FB EX CONC.: To Bangkok: Colour-Chem Ltd., 1,000 Kgs., Rs. 89,220.

GREEN FB EX. CONC.: To Singapore: Colour-Chem Ltd., 200 Kgs., Rs. 16,611.

HANSA YELLOW G: To Colombo: Colour Chem Ltd., 25 Kgs., Rs. 4,282.

LAKE RED TONER LCLL: To Colombo: Colour-Chem Ltd., 25 Kgs., Rs. 1,675.

LAKE SCARLET CTL: To Colombo: Colour-Chem Ltd., 150 Kgs., Rs. 10,054.

MALACHITE GREEN POWDER: To Rotterdam: Chika Ltd., 12,000 Kgs., Rs. 12,80,000.

METHYL VIOLET: To Singapore: K. Patel Chemo Pharma Pvt. Ltd., 1,000 Kgs., Rs. 1,15,000.

METHYL VIOLET 2B PDR: To Buenos Aires: Ravi Chem Dye, 300 Kgs., Rs. 47,566.

METHYLENE BLUE B5: To Buenos Aires: Ravi Chem Dye, 100 Kgs., Rs. 21,757.

NAPHTHOL AS: To Odessa: Amar Dye Chem Ltd., 8,400 Kgs., Rs. 9,74,400.

NAPHTHOL AS-SW: To Hamburg: Associated Intermediates & Chemicals, 500 Kgs., Rs. 1,08,000.

NOVATIC BLACK NB: To New York: Atic Industries Ltd., 1,374 Kgs., Rs. 6,41,702.

NAVINON YELLOW GCN: To Hamburg: Mangalya Trading & Invt. Ltd., 250 Kgs., Rs. 89,000.

OLIVE GREEN FB EX. CONC.: To Colombo: Colour-Chem Ltd., 100 Kgs., Rs. 1,434.

ORANGE FR: To Bangkok: Colour Chem Ltd., 750 Kgs., Rs. 64,979.

OPTICAL WHITENING AGENT: To Bangkok: IDI Ltd., 2,000 Kgs., Rs. 1,13,000; To Los Angeles: IDI Ltd., 1,364 Kgs., Rs. 6,13,000.

ORGANIC PIGMENTS: To Colombo: Colour-Chem Ltd., 12.9 Kgs., Rs. 6,994.

PERMANENT YELLOW DHG: To Colombo: Colour Chem Ltd., 600 Kgs. Rs. 43,170.

PHTHALOCYANINE: To Bangkok Colour Chem Ltd., 900 Kgs. Rs. 1,35,370.

ITHALOCYANINE BLUE 2636: olombo: Sudarshan Chemical Inds. 200 Kgs., Rs. 24,390.

ITHALOCYANINE GREEN GN: Colombo: Colour Chem Ltd., 50 Rs. 4,844.

ITHALOCYANINE GREEN: To mbo: Sudarshan Chemical Ind. 200 Kgs., Rs. 23,930.

HTHALOCYAMINE GREEN ; To Keelung: Sudarshan Chemi- Inds. Ltd., 1,300 Kgs., 2,85,106.38.

HTHALOCYANINE GREEN K: To Colombo: Colour Chem Ltd., Kgs., Rs. 39,554; To Jakarta: our Chem Ltd., 1,000 Kgs., 1,87,489; To Singapore: Colour m Ltd., 2,000 Kgs., Rs. 3,26,170.

IGMENTS: To Bangkok: Sanjay s Corpn., 600 Kgs., Rs. 1,01,316; Hong Kong: Sudarshan Chemical . Ltd., 1,000 Kgs., Rs. 1,93,838; To terdam: Sanjay Sales Corpn., 2,000 ., Rs. 3,96,717; To Singapore: jay Sales Corpn., 1,000 Kgs., 1,37,280.

IGMENT GREEN 807: To Hong g: Sudarshan Chem Inds. Pvt. Ltd., 0 Kgs., Rs. 1,18,047.

IGMENT LAKE RED LC: To ombo: Colour-Chem Ltd., 50 Kgs., 3,350.

RANGAZOL GOL. YELLOW L: To Charleston: Janson Intl., 1,500 ., Rs. 2,62,127.

REACTOFIX NAVY BLUE ME 2 To Antwerp: R.P. Trading Co., 500 s., Rs. 97,000.

RECTOFIX SUPRA GREEN: To san: Jaysynth Dyechem Ltd., 940 s., Rs. 1,63,404.

REACTOFIX SUPRA TURQ: To san: Jaysynth Dyechem Ltd., 1,000 s., Rs. 1,49,707.

REACTOFIX SUPRA YELLOW HL: To Sydney: R.P. Trading Co., 50 Kgs., Rs. 2,46,808.

REACTOFIX SUPRA YELLOW HGRL: To Genoa: Jaysynth Dyechem Ltd., 3,000 Kgs., Rs. 6,43,404.

REACTIVE BLACK: To Charleston: Jansons Intl., 5,000 Kgs., Rs. 5,47,234; To Genoa: Metro Chem Inds., 3,000 Kgs., Rs. 2,80,851.

REACTIVE BLUE: To Charleston: Jansons Intl., 2,000 Kgs., Rs. 3,91,489.

REACTIVE DARK BLUE: To Antwerp: Kantilal Sanghvi & Co., 1,000 Kgs., Rs. 1,64,329.

REACTIVE DYES: To Jakarta: Vivid Exports Pvt. Ltd., 750 Kgs., Rs. 95,132; 500 Kgs., Rs. 1,01,821; To Keelung: Archana Finance Corpn., 5,000 Kgs., Rs. 4,40,000.

REACTIVE ORANGE: To Manchester: Associated Intermediates & Chemicals, 400 Kgs., Rs. 67,000.

REACTIVE RED 5B: To Mombasa: Roffe Impex International Pvt. Ltd., 300 Kgs., Rs. 36,766.

REACTIVE RED 141/ME7B: To Charleston: Integrated Trading co., 1,000 Kgs., Rs. 1,48,034.

REACTIVE TURQUOISE BLUE BP: To Charleston: Swastik Work Trade Corpn., 1,000 Kgs., Rs. 1,15,000.

REACTIVE TURQ. BLUE HA: To Rotterdam: Mivin Overseas, 1,000 Kgs., Rs. 1,88,936.

REATIVE YELLOW: To Charleston: Jansons International, 1,000 Kgs., Rs. 2,77,446; To Hamburg: Valia Chemicals Pvt. Ltd., 1,000 Kgs., Rs. 3,06,382.

REACTIVE YELLOW 15: To Charleston: Jansons Intl., 7,000 Kgs., Rs. 14,72,339; To Genoa: Metro Chem Inds., 1,000 Kgs., Rs. 1,74,896.

REACTIVE YELLOW HEAR: To Liverpool: Karsandas Mavji, 1,000 Kgs., Rs. 1,34,854.

RED FRG EX. CONC: To Colombo: Colour Chem Ltd., 50 Kgs., Rs. Rs. 6,744.

RED LAKE C 507: To Hong Kong: Sudarshan Chemical Inds., 2,100 Kgs., Rs. 2,19,389.

REMAZOL BRILLIANT ORANGE 3R: To Bangkok: Colour Chem Ltd., 2,000 Kgs., Rs. 2,92,034.

RHODAMINE: To Liverpool: Indian Dyestuffs & Chemicals Mfg., 2,000 Kgs., Rs. 4,83,454.

RUBINE TONER C6B: To Colombo: Colour Chem Ltd., 100 Kgs., Rs. 7,823.

SCARLET CHROME 1483: To Bangkok: Sudarshan Chemical Inds., 1,000 Kgs., Rs. 54,178.

S.F. YELLOW DHG: To Colombo: Sudarshan Chemical Inds. Ltd., 200 Kgs., Rs. 30,350.

S.F. RED FLR 323; To Colombo: Sudarshan Chemical Inds. Ltd., 200 Kgs., Rs. 38,920.

TOLUIDINE RED 40%: To Manila: Sudarshan Chemical Inds., 1,000 Kgs., Rs. 1,53,821.

TURQUOISE BLUE: To Keelung: Sanjay Sales Corpn., 500 Kgs., Rs. 82,629.

VAT GREEN FFB: To Genoa: Karsandas Mavji, 1,000 Kgs., Rs. 3,71,736.

VAT ORANGE: To Rotterdam: French Dyes & Chemicals, 2,000 Kgs., Rs. 1,84,000.

VIOLET FFR: To Penang: Colour Chem Ltd., 300 Kgs., Rs. 33,760.

ULTRAMARINE BLUE: To Bahrain; Balsara Hygine Products Ltd., 290 Kgs., Rs. 12,100.

ULTRAMARINE BLUE IND: To Damman: Balsara Hygine Products Ltd., 36 Kgs., Rs. 7,500.

YELLOW DHG: To Colombo: Colour Chem Ltd., 50 Kgs., Rs. 3,525.

YELLOW FGM EX. CONC: To Singapore: Colour Chem Ltd., 25 Kgs., Rs. 1,459.

YELLOW GR: To Colombo: Colour Chem Ltd., 50 Kgs., Rs. 6,894.

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AMOXYCILLIN BP 88: To Hamburg: Armour Chemicals Limited, 3,190 Kgs., Rs. 32,48,340.

AMOXYCILLIN TRIHYDRATE BP 88/USP: To Copenhagen: Gujarat Lyka Organcis Ltd., 700 K Rs. 7,49,787.

AMPICILLIN TRIHYDRATE Odessa: Ranbaxy Laboratories 6,000 Kgs., Rs. 57,30,000; To Ru Allanasons Ltd., 7,500 K Rs. 71,62,500.

AMPICILLIN TRIHYDRATE To Copenhagen: Supriya Drugs Pharmaceuticals, 1,250 K Rs. 10,65,532; To Odessa: Guj Lyka Organics Ltd., 7,500 K Rs. 71,62,500; To Port Kelung: E sian Inds., 250 Kgs., Rs. 2,57,200

CHLORPHENIRAMINE MA ATE: To Bangkok: Venkatrama Ch icals Ltd., 500 Kgs., Rs. 2,96,608; Genoa: IPCA Laboratories Ltd., Kgs., Rs. 1,27,700.

CHLORPHENIRAMINE MA ATE BP: To Hamburg: Venkatra Chemicals Ltd., 1,000 Kg Rs. 6,16,216.

CHLORPHENIRAMINE MA ATE BP 88: To Hamburg: Me Pharmaceuticals Inds., 450 Kg Rs. 2,88,000.

CHLOROQUINE PHOSPHATE: Hamburg: IPCA Laboratories L 23,175 Kgs., Rs. 9,65,000.

DI-IODOHYDROXY QUINOLI B.P.: To Bangkok: Kirti Chemic Ltd., 500 Kgs., Rs. 1,60,000.

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